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Textile World

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Editor: Douglas Woolf

Look Beyond Rayon!

WE HAVE consistently predicted an unpredictable future for synthetic fibers.

We have repeatedly stated that expansion of the industry, over the broad future, was assured; and that it was impossible to set any limit as an estimate of the extent of that expansion.

And in rayon's dark year of 1930, we say so again.

But, in making that prediction, we have never talked *rayon;* we have talked *synthetic fibers.*

To us, rayon is merely the first important member of the synthetic fiber group—the forerunner of what may develop into a synthetic fiber age.

It is, as we have stated in these columns before, quite within the realm of possibility that synthetic fibers may eventually replace natural fibers to a large degree—just as synthetic dyes have replaced natural dyes.

But it is *not* within the realm of possibility that rayon, as we know it today, will replace cotton, wool, silk, linen and the other natural fibers —any more than Perkins' mauve and allied types of dyes, in themselves, could have rendered all natural coloring-matters unnecessary.

The synthetic dye industry owes its present world position to more than a half-century of research directed toward the development of a complete line of dyes, capable of replacing all existing dyes in point of shade, fastness, and application to specific fibers—and, in addition, excelling them in quality, cheapness, and uniformity.

If synthetic fibers are to achieve a similar position, it must be through that same type of research.

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A start has been made.

Today's rayon bears as little resemblance to pre-war artificial silk, as prohibition "hooch" bears to pre-war Scotch. In strength, appearance and versatility, it is a totally different fiber.

With this development, has come an increasing knowledge of the fundamental chemistry and physics underlying the technique of synthetic fiber production.

But, we repeat, this is only a start.

More important still, we feel that the industry has lost sight of this research phase in the recent months of price-cutting and general chaos.

That is natural, possibly—but it is dangerous, certainly.

The economic prostration of the industry, which such tactics must inevitably produce, would sound the death knell of further research development. The scientific progress made in rayon in the last decade has been due very largely to the financial incentive provided by an attractive and broadening market situation. Remove that incentive and the synthetic fiber possibilities, just now awakening, will sink again into slumber, to be aroused only by a new and saner generation of industrialists.

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It is time to stop thinking in terms of unlimited production of rayon—and to begin thinking in terms of unlimited development of new and better types of synthetic fibers.

Running plants at capacity when demand does not warrant it, and selling below cost to dispose of the output, may temporarily embarrass a competitor—but will permanently cripple the industry as a whole and indefinitely defer its broader development.

To those who see in rayon merely an attractive commercial opportunity, to be exploited for a few years, such a procedure will probably seem quite all right.

But to those who, like ourselves, see in rayon merely the beginnings of synthetic fiber possibilities, there is only one answer:

Look ahead in rayon!

Or rather, look beyond rayon!

Like the "Tree-Sitters,"

RAYON INDUSTRY Sets

Table I—TEXTILE WORLD'S Estimate of Domestic Rayon Production (in Pounds)

	Total 1926	Total 1927	Total 1928	Total 1929	First 7 Months of 1930	Total 1930	Total 1931
Viscose Co.	37,000,000	41,000,000	54,000,000	62,000,000	*30,000,000*	62,500,000	70,000,000
Du Pont Rayon Co.	10,900,000	15,100,000	18,231,000	24,500,000	*11,750,000*	20,250,000	27,000,000
Tubize Chatillon Corp.	7,000,000	7,500,000	8,500,000	10,250,000*	*6,000,000*	11,000,000	15,000,000
Celanese Corp.	2,500,000	3,500,000	5,000,000	7,000,000	*5,750,000*	10,000,000	15,000,000
Industrial Rayon Corp.	3,400,000	3,450,000	4,250,000	5,375,000	*5,800,000*	10,550,000	12,000,000
American Glanzstoff			350,000	3,850,000	*4,000,000*	7,000,000	9,000,000
American Enka Corp.				625,000	*2,600,000*	4,600,000	6,000,000
American Bemberg Corp.			2,100,000	2,300,000	*1,750,000*	3,000,000	5,000,000
Skenandoa Rayon Corp.			1,150,000	1,330,000	*966,000*	1,932,000	3,500,000
Delaware Rayon Co.		500,000	1,500,000	2,000,000	*875,000*	1,500,000	2,000,000
Belamose Corp.	875,000	1,400,000	1,380,000	1,500,000	*885,000*	1,585,000	1,800,000
Woonsocket Rayon Co.				**	*594,000*	1,184,000	1,560,000
New Bedford Rayon Co.				500,000	*820,000*	1,420,000	1,500,000
Acme Rayon Corp.	400,000	500,000	740,250	900,000	*598,000*	1,098,000	1,000,000
Hampton Co				**	*600,000*	1,000,000	1,000,000
Other Companies	500,000	2,100,000	500,000	1,000,000	*1,000,000*	1,750,000	3,000,000
Total	62,575,000	75,050,000	97,701,250	123,130,000	*73,988,000*	130,369,000	174,360,000

*Combined production of Tubize Artificial Silk Co., and American Chatillon Corp. ** Included in "Other Companies" in 1929.

THERE is no doubt that the year 1930 will close with new records established in "tree-sitting," both with and without cats. Nor is there any question that the same year will witness new records in the production and sale of rayon and other synthetic fibers. But in neither case are the records particularly enviable.

In rayon, it appears that the following marks will be set: (1) It will be the first year in the decade covering the real rayon impetus, in which both domestic and world production will have made no appreciable gain; (2) imports into the United States will have declined more than 50%; (3) prices will have established a new all-time low; (4) unprecedented market demoralization, *in a controllable fiber,* will have been the keynote.

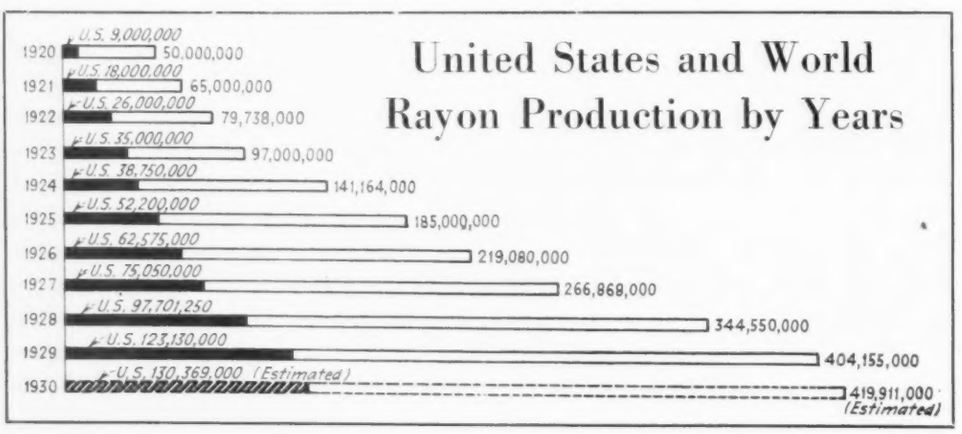
The harrassed automobile manufacturer, the bankrupt radio dealer, the bewildered stock broker will say: "Well, for the year 1930, that's not so bad." True. But, with that word *controllable* in mind, one must respond with the colloquialism: "and it's not so good."

Fact

Our impressions of "tree-sitting" are based upon casual, and rather supercilious, newspaper reading. Our statements on rayon are based upon analysis of the facts:

1. United States production of rayon and other synthetic fibers, during the first seven months of 1930, is estimated by TEXTILE WORLD at 73,988,000 lb.

2. On the basis of this actual production, and keeping in mind the plans of producers and the market outlook, we estimate the domestic output for the entire year at



New but Unenviable Records

By Douglas G. Woolf

Editor, TEXTILE WORLD

130,369,000 lb.—only slightly above the 1929 production of 123,130,000 lb., and 20% below the estimate of 162,250,000 lb. for 1930 made in January.

3. The estimate for 1931 domestic production—with, obviously, all sorts of qualifications and reservations—is 174,360,000 lb., or slightly more than the total originally estimated for 1930.

4. The arrested progress of the industry, at least from a quantity production standpoint, was not confined to the United States; it was world-wide. The 1930 world output is estimated by our Manchester (Eng.) rayon correspondent at 419,911,000 lb., or only slightly more than the 1929 production of 404,155,000 lb. In other words, the ratio between the two years is practically the same in both this country and the world.

5. Imports of rayon yarns into the United States during 1930 are estimated at 6,617,012 lb., a decline of over 58% from 1929 imports.

6. The one-time visionary prediction of dollar rayon was more than fulfilled. The *list* price of 150-denier, 24-32 filament, first quality yarn (the key number) was reduced in July to 95c. The *actual* price, in some cases, was "what have you?"

Before advancing, or retrogressing, from fact to opinion, it should be emphasized that the above statistical data are not indisputable. They are, necessarily, estimates—and under present market conditions estimating is a difficult job. The trend is toward improvement, but the extent and permanence of that improvement is not predictable. Furthermore, in some cases producers have been less inclined, owing to the complicated situation, to give out information than they have in the past. However, the figures have been developed after careful weighing of all data available and of all present indications. Revisions may be necessary at the end of the year, but it is most unlikely that they will be sharp enough to affect materially the general conclusions drawn.

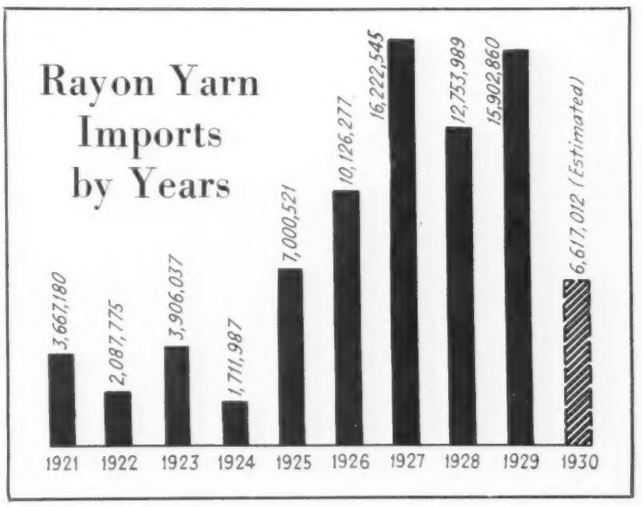
Opinion

Given this set of facts, what are the causes of the rayon depression?

The principal ones have been:

1. General business depression.

2. Sharply curtailed operations of textile mills which consume rayon—resulting partly from cause (1), and partly from specific textile troubles.



3. Collapse of raw silk market, placing that fiber more nearly in competitive position with rayon.

4. High-pressure and uneconomic buying tactics on the part of mill consumers—brought about partly of course by causes (1) and (2).

5. Excessive and unsound competition among rayon producers, accompanied by unbalanced production, ruthless price-cutting, and partial collapse of cooperative activities.

It will be seen at a glance that, of these five causes, only one—the fifth—is directly traceable to the rayon producers themselves. The others developed from situations largely beyond their control.

However, the inescapable fact remains that, while the causes themselves could not have been averted, their effect could have been measurably restricted by more

Table II—Rayon Yarn Imports, by Months

	1924 Lb.	1925 Lb.	1926 Lb.	1927 Lb.	1928 Lb.	1929 Lb.	1930 Lb.
January	251,951	205,627	597,103	680,610	1,366,018	1,707,429	1,159,169
February	132,717	619,408	643,448	861,339	1,145,746	1,266,564	962,925
March	87,430	522,139	1,257,034	1,757,208	1,079,582	1,454,040	927,895
April	89,444	431,686	739,247	1,518,320	843,803	1,626,453	891,342
May	96,555	332,737	769,477	1,785,538	909,386	1,589,337	487,225
June	144,664	308,592	857,912	1,312,912	820,809	1,581,832	382,973
July	78,050	546,695	739,128	1,231,124	658,949	857,600	133,183
August	119,196	590,357	661,759	1,510,748	1,004,829	989,535	.....
September	181,614	622,304	878,604	1,129,476	924,219	1,044,434	.....
October	170,120	825,223	995,315	1,385,745	1,238,085	1,540,178	.....
November	170,238	1,118,679	964,164	1,285,157	1,003,681	1,083,370	.....
December	190,008	877,064	1,023,096	1,764,368	1,758,882	1,162,088	.....
Total	1,711,987	7,000,521	10,126,277	16,222,545	12,753,989	15,902,860	*6,617,012

*Estimated on the assumption that imports for the last five months of 1930 will be at the same average monthly rate as for the three months ended July 31.

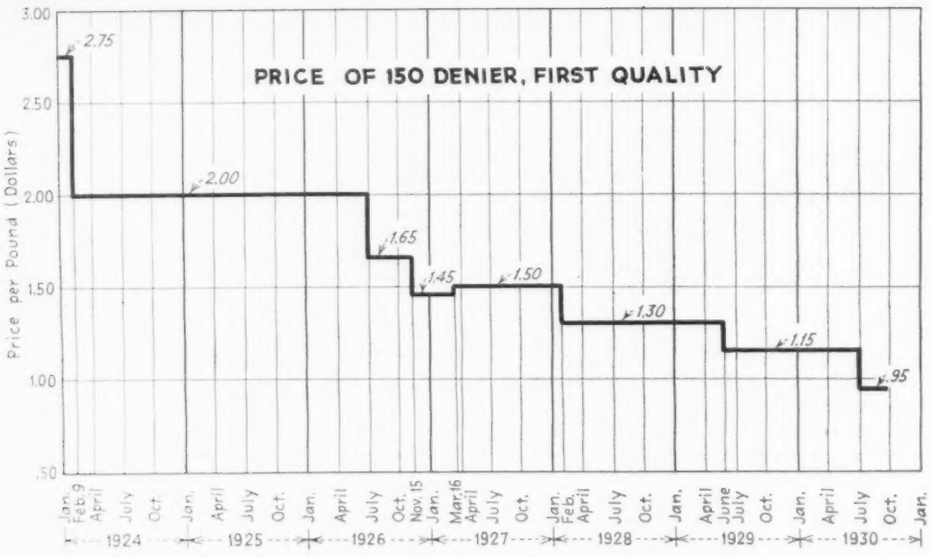


Chart showing rayon price trend for last seven years

intelligent and scientific merchandising tactics in producing circles.

Boll weevil, drought, and other vagaries of nature do not threaten the manufacturer of synthetic fibers. Nor is the industry scattered among thousands of plants; some 15 companies constitute the field. Consequently, market stability *can* obtain if the producers *will* it.

Failure to produce more rayon this year than last is in itself no calamity. Business conditions made some decline from original estimates inevitable. But failure to produce in an orderly manner, and in accurate balance with fluctuating demand, brought demoralization and, to some extent, curtailed the quantity which could ultimately be sold.

Reduction of list prices below the dollar mark is likewise no calamity in itself. For years we have stated that the price trend in rayon over the broad future must necessarily be downward, as large-scale production and technical research develop economies. Such reduction means an ever-increasing market for the fiber. But reductions preceded by sub-rosa price-cutting, by substitution of first quality for second quality to move stocks, by special and unwarranted discounts, constitute a calamity not only to 15 producers but to thousands of mills which have seen in rayon one more tool for hastening the new textile era.

The Cure

All of which sounds very pessimistic.

It might seem destructively so if the writer had a reputation as a "bear" on rayon. He happens to have been subject to criticism, over a period of years, for excessive bullishness. He is today as confident of the possibilities of synthetic fibers, over the broad future, as he ever has been.

Nor is the immediate future unpromising. Better business has set in already, and indications point to a moderately expanding consumption of rayon during the fall.

Nevertheless, a constructively pessimistic view of this year's developments to date must be taken if the return of chaos is to be averted in the future.

The cure for such an uneconomic situation, so far as the yarn producers are concerned, rests in:

1. Restoration of cooperative attitude within the rayon industry.

2. Balancing production to demand, along the lines initiated by producers earlier in the year, but from which they were diverted by an epidemic of price-cutting.

3. Refusal to sell below list prices; and sane, orderly revision of those prices as conditions warrant.

4. More scientific cultivation of the domestic market, including increased technical service to mill consumers; and an investigation, even though a belated one, into the possibilities of foreign outlets for yarn.

5. Aggressive prosecution of research work, in order to develop first the broadest possibilities in the direction of new types of yarn, second more efficient processes for its production, and third new opportunities for its utilization.

Individual manufacturers may point to the record and claim that they have followed most or all of these suggestions in the past. It is true that certain plants operated on as low as a 50% basis at one time during the year in an honest attempt to balance production to demand. It is true that great strides have been made in improving the quality and usefulness of synthetic fibers. It is true that organized cooperative effort was initiated with good prospects of effectiveness.

But the fact remains that practically every rayon manufacturer will tell you that unintelligent price-cutting nullified these intelligent activities.

It is within neither our function nor our ability to separate the sheep from the goats. An attempt to chart the blame, as we have had it "authoritatively" apportioned for us by various men in the trade, would produce a Chinese puzzle.

It *is* within our function, however, to point out that 100% adherence to sound merchandising policies is necessary if 1930's experience is not to recur—and that the rayon industry, through the controllable nature of its processes and through its centralization within a small group of plants, has no alibi if it fails to develop that 100% adherence.

World Rayon Production

Sharply Exceeds Consumption

THE world production of rayon in 1930 is estimated at 419,911,000 lb., while the actual consumption is estimated to reach only 385,980,000 lb., indicating a serious increase in stocks. It is possible that these estimates may turn out to be too pessimistic, but in view of the conditions prevailing throughout the world and the known surplus of production over sales in the first half of the year, this change in relationship can by no means be assured.

Full details of the estimates are shown in Table I. In this, production and exports and imports of the various countries are shown together with what is described as the theoretical consumption and also the estimated consumption. The theoretical consumption is arrived at by adding imports to production and deducting exports. This very rough and ready method of calculation may have been of some avail during the period when almost every pound of rayon produced was snapped up but it is not so today.

It is obvious that where the estimated consumption is lower than the theoretical consumption, there the actual sale of yarns has been lower than the production plus imports. It will be noted that there is only one important case where the sale of yarns this year appears likely to exceed the output plus imports and that is Germany. It is possible moreover that in this case the figures may prove incorrect for there has been a huge importation from Italy and other countries, and it is impossible to ascertain how much of this will be consumed before the end of the year. If there is a large surplus the actual sales may fall below the figure indicated.

The estimated production in Europe during 1930 slightly exceeds the final estimates for 1929 which showed a total of 255,728,000 lb. against 258,082,000 lb. for 1930. The variations in the different countries of the world are interesting and are shown in Table II.

It will be noted in Table I that the estimated surplus of exports over imports in Europe is 44,490,000 lb., and it is this trade which is causing considerable perturbation as it is necessary for it not only to be maintained but to be increased. In view of the fact that the United States is apparently to be a closed market for European yarns, and as the demand from Canada is limited, the immediate future must necessitate an increased trade with Australia, South America and Asia.

The outlook is clouded by the general economic conditions, which are seriously affecting the purchase of rayon yarns, and this seems likely to continue for some time to come. Until the position is clearer the problem of stocks will be an important one in Europe though in this respect, Britain, being not so dependent upon the export trade in rayon, is somewhat better placed and is now fully clearing production. Australia forms an important outlet for British yarns and there are attempts to compete on the part of European producers.

Production of rayon by the various processes forms an interesting study. In Table III the position for the last three years is shown. It will be noted that the only process where marked progress has been made is acetate. The fall in cuprammonium may be temporary but it is to be feared that in any case producers in Europe cannot face the costs involved in nitro-cellulose rayon.

Table I—World Production and Consumption of Rayon, 1930

(In 1,000 lb.)

	Production	Imports	Exports	Theoretical Consumption	Estimated Consumption
Austria	2,090	3,080	1,650	3,520	3,080
Belgium	12,320	1,650	6,160	7,810	7,040
Britain	50,600	550	6,600	44,550	40,700
Czechoslovakia	3,960	8,470	1,760	10,670	10,120
France	40,810	3,135	18,700	25,245	22,000
Germany	44,000	25,300	16,170	53,130	55,000
Greece	110	.....	.....	110	110
Holland	17,600	2,750	17,710	2,640	2,640
Hungary	550	3,080	396	3,234	3,740
Italy	66,000	2,420	36,300	32,120	29,920
Poland	5,500	660	1,870	4,290	4,070
Spain	2,860	6,600	.....	9,460	8,800
Sweden	462	2,200	22	2,640	2,860
Switzerland	11,220	3,960	8,250	6,930	6,380
Other European	.....	7,243	.....	7,243	5,830
Total	*258,082*	*71,098*	*115,588*	*213,592*	*202,290*
China	.....	18,700	.....	18,700	16,500
India	.....	6,490	.....	6,490	6,050
Japan	26,400	880	2,200	25,080	23,100
Other Asia	.....	2,200	.....	2,200	1,980
Total	*26,400*	*28,270*	*2,200*	*52,470*	*47,630*
Total Africa	.....	2,200	.....	2,200	1,980
Canada	5,060	1,870	.....	6,930	6,600
United States	130,369	6,617	308	136,678	120,000
Other N. A.	.....	1,760	.....	1,760	1,650
Total	*135,429*	*10,247*	*308*	*145,368*	*128,250*
S. America	.....	2,200	.....	2,200	1,980
Australasia	.....	4,081	.....	4,081	3,850
Grand Total	419,911	118,096	118,096	419,911	385,980

Table II—World Production of Rayon by Countries

(In 1,000 lb.)

	1926	1927	1928	1929	1930
United States	62,575	75,050	97,700	123,130	130,396
Italy	35,000	36,000	47,000	59,000	66,000
Britain	25,500	38,803	51,000	53,100	50,600
Germany	26,000	31,000	41,000	45,000	44,000
France	17,500	21,000	30,000	37,000	40,810
Holland	13,500	16,500	16,500	20,000	17,600
Japan	5,500	8,000	12,000	18,000	26,400
Belgium	13,100	13,500	15,000	15,000	12,320
Switzerland	8,000	10,340	12,000	12,250	11,220
Poland	2,000	4,000	5,000	5,435	5,500
Czechoslovakia	2,800	3,500	3,500	4,250	3,960
Austria	3,500	3,500	4,000	3,620	2,090
Canada	2,250	2,600	3,500	3,750	5,060
Spain	300	1,000	2,500	2,000	2,860
Brazil	*	*	750	950	*
Hungary	*	*	600	670	550
All others	1,555	2,075	1,500	1,000	572
	219,080	266,868	344,550	404,155	419,911

*Included in all others.

Table III—World Production of Rayon by Processes

(In 1,000 lb.)

Process	1928	1929	1930
Viscose	290,470	347,298	363,271
Acetate	25,100	26,097	32,648
Cuprammonium	13,950	15,920	14,396
Nitro-cellulose	15,030	14,840	9,596
Total	344,550	404,155	419,911

The Year's Technical Developments in Rayon Manufacture

By Harold DeWitt Smith, Ch.E., Ph.D., A.T.I.

Textile Technologist, A. M. Tenney Associates, New York

THE material for this review of the year's progress in the rayon industry has been gathered from many sources, ranging from a careful perusal of the literature to the direct accumulation of day-by-day experiences and information. While it has been impossible to trace every assertion back to its original source, the writer has endeavored to present a summary of the year's progress as he sees it.

Of the four commercially important methods of manufacturing rayon, the viscose process has maintained its position as the major source of this fiber. (The term "rayon" as used in this article includes all of the so-called synthetic fibers.) The acetate process has forged ahead, especially in this country, where several of the established viscose producers have entered the acetate field. The cuprammonium process is still confined practically to one organization and its subsidiaries, which use the same basic process, although there are in Europe one or two other commercially successful producers of this type yarn. The nitrocellulose process, which developed from the original process of Count Chardonnet, is reported to be in eclipse in Europe, where it has been largely replaced by one or more of the other processes. In this country it is still being made successfully. The dull-luster or opaque nitro-cellulose yarn is enjoying a considerable vogue. It has been reported that the lustrous nitrocellulose yarns in finer deniers, which have found a place in the market because of their lower cost of manufacture, will soon be available in increased filament counts in order to compete with the fine-denier acetate and cuprammonium yarns.

The drastic reductions in the prices of the rayons which have occurred since the beginning of 1930, along with the general decline in textiles and other commodities, has served to emphasize and hasten the trend toward the economic improvement of the various processes which was already in evidence. It is true that the research work which has been carried on by the various companies during the past year has resulted in a further general improvement in the quality of the products, and continued gradual improvement may be expected in the future. Nevertheless the industry has now reached the stage of keen economic competition in which the emphasis has shifted from the expectation of further radical improvements in quality to the search for methods and machinery which will lower the cost of manufacture. This movement is particularly concerned with reducing the labor costs, in which field very decided progress has been made.

Raw Materials

As raw materials, wood pulp and cotton linters still reign supreme, other cheap sources of cellulose—such as corn stalks, sugar cane, peanut shells, banana fiber, and the like—have been proved more or less practicable from a chemical standpoint by laboratory and semi-commercial demonstrations; but either the cost of preparation or the question of uniformity and volume of the supply has prevented their actual adoption. An additional source of raw material from cotton has been developed by processing the cotton seed-coat for the very short hull fibers after the removal of the linters. These are even cheaper than the linters and are providing keen competition with wood pulp. The wood-pulp manufacturers, on the other hand, are hard at work on the problem of producing a bleached pulp of high alpha-cellulose content from Southern pine which will be suitable for paper making and for rayon.

Viscose Process

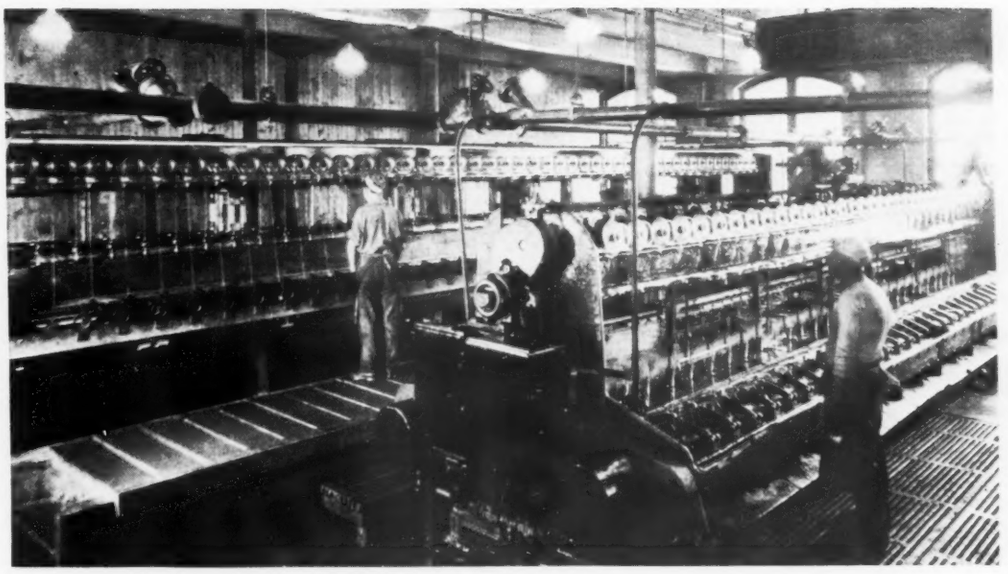
The outstanding development in the viscose process is the decided ascendency of the bobbin over the pot or centrifugal method of spinning, as well as the increase in the size of the bobbin, which has grown from an original diameter of 70 mm. through the 90-mm. and 115-mm. stages to a 125-mm. size. The latter size is being successfully handled on spinning machine and twister.

Taking up the various stages of the process chronologically, a brief mention of the various improvements in machinery and methods for viscose manufacture which are actually available and being tried out in practical use will illustrate the extent of the movement toward economic rationalization which is taking place.

In France a continuous process is available for making and disintegrating the alkali cellulose. The cut cellulose sheets are steeped in baskets which are automatically lowered into and removed from the steeping vat. Continuous pressing of the steeped sheets is carried out by feeding them into a special spiral-screw machine, which delivers the pressed alkali cellulose in small compact masses to a set of three continuous disintegrators mounted in one shaft. An installation cost of one-third that of the old process and a saving in floor space are claimed for this apparatus.

At the "Achema" or exposition of chemical machinery and apparatus held recently at Frankfort on the Main, Germany, one of the exhibits in the rayon section was a vacuum xanthate kneader which, it is said, will sulphidize and dissolve a batch of 750 kg. in 4½ hours, replacing several sulphidizing drums and dissolvers. It is interesting to note in passing that this exhibition marks the first occasion upon which any group of competing makers of rayon machinery have come together to display their wares openly—surely a sign that the industry is passing from the secretive, adolescent stage to one of more mature, cooperative competition.

At least one manufacturer has replaced the usual filter presses which are used to filter and clarify the viscose



Scene in rayon spinning department

solution before spinning by a set of continuous centrifugal separators.

Many Other Developments

There have been many minor developments, such as a new method of boring spinnerets which makes finer, cleaner holes; improvements in candle filters; and improvements in the various types of pumps. Apparently no clear-cut decisions as to the superiority of either gear or piston pump has been reached. While both types have been improved and both are still in general use, the piston type is perhaps gaining in favor. In one of its newest forms, the bottle or reservoir has been eliminated, thus obviating the need for frequent changing in order to remove the spinning dope which stagnates there. The English have developed a new rotary pump which, it is claimed, is equal to the gear type in uniformity and adjustability of the delivery per revolution.

As to the spinning machines themselves, structural steel is replacing castings for the frames. The newer machines, especially those of the pot-spinning type, show improvement in design with reference to accessibility of parts.

Bobbin-spinning machines of the automatic type have been developed by several makers. On these machines the speed of the bobbin is so regulated as to give a uniform speed of take-up of the yarn at all times, and hence a uniform denier. Two, or sometimes four, bobbins per spinneret are so arranged that when one bobbin is full an empty one swings automatically into place in such a way that the strand of yarn is broken from the old bobbin and transferred to the new one. By the use of four spindles per spinneret, the full bobbin can be made to dip into a trough for after-treatment. The labor required for such an automatic machine is said to be about one-third that of the old type, since the normal operations are confined to doffing full bobbins and putting on empty ones.

In addition to the use of larger bobbins—which, as mentioned above, is rapidly becoming universal—one domestic machinery maker has developed an undulating type of wind which is said to reduce the time necessary for washing a normal bobbin or to permit a fuller bobbin to be washed in the usual time.

Another attempt to speed up the washing operation is the development of a centrifugal washer which reverses the present suction or vacuum washing by throwing the water out through the rapidly rotating full bobbin. A reduction in washing time to one-sixth of that required for vacuum washing is claimed.

Skeins Still Necessary for After-Treatment

For after-treatment, the yarn, whether bobbin or pot spun, must still be wound into skeins. Makers of pot-spinning machinery are working on methods of desulferizing and bleaching in the cake, but this has not yet been thoroughly tested on a commercial scale. All efforts to carry the bobbin-spun yarn through these processes without removal from the spinning bobbin have apparently failed, due to the difficulty of finding material for the bobbins which will have suitable mechanical properties combined with sufficient chemical resistance to the desulphurizing and bleaching liquors. A possible exception to this statement is the frequently mentioned Brandwood system which is being tried out in England and in France. Information as to the actual progress being made is meager; so that here, as in the case of several other departures from the usual methods of manufacture, one must judge the results by the financial progress of the concerns involved. Recent reports have it that the British companies which are working this process have been operating at a loss. There is but little doubt, however, that a solution to this problem will be found and that the future will see the complete handling of the yarn from spinning machine to final winding carried out without removal from the bobbin.

Efforts to rationalize the after-treatment of the viscose skeins have developed machines which automatically carry the skeins through the processes of desulphurizing and bleaching and the intermediate washings. The skeins are on poles which are automatically turned and slowly carried forward. Instead of the skeins being dipped into vats, the solutions are applied as sprays from above and drain off into basins below. Here again the labor cost is reduced and the power cost is said to be low.

Another sign of the growing importance of cost reduction is the increasing attention being paid to the recovery of chemicals. While not as important as the recovery

of the volatile solvents in the nitro and acetate processes, recovery of caustic soda and sulphuric acid is gaining.

The Lilienfeld process, which represents the most radical development in the viscose process in recent years, has so far failed to justify the hopes of its sponsors. In spite of recently published articles by the inventor in defense of his process and the statement of the English firm which has been developing the process that it has solved the troubles and is now ready to manufacture successfully, the fact remains that this company has had to wind up its affairs because the cost of development has eaten up the capital. Courtaulds ceased to handle the yarn of this company. Efforts to develop a line of sewing thread made of Lilienfeld yarn in this country have apparently made little progress.

Another variation of the viscose type—namely, the hollow-filament yarns which have been manufactured for a number of years—seems to be declining in favor, probably because the desired softness, pliability, and cover are being attained by fine-filament yarns of other types. One German company has discontinued operations; a second has greatly reduced its production after losing its entire capitalization within a few years. In this country the hollow-filament yarn which was being manufactured a year ago by one of the large viscose yarn producers has since been discontinued.

Acetate Process

In Continental Europe the fundamental raw materials for the manufacture of cellulose-acetate yarn are cotton linters, water, limestone, coke, sulphuric acid, and cheap electric power. By synthetic processes which have attained great importance, especially in Europe, acetic acid and acetic anhydride are being made from acetylene gas, which in turn results from the well-known reaction of calcium carbide (made in the electric furnace from burnt lime and coke) with water. The other essential chemical, acetone, is also produced synthetically from acetic acid. In the United States, however, the distillation of wood still provides the major source of acetic acid and related products. The spread of the synthetic methods will of course depend solely upon whether or not they can produce at lower cost than the older methods.

In this process, as in the others, rationalization is in progress. One of its manifestations is the effort to increase the spinning speed. It is reported that a speed of 300 meters per minute has been commonly used in Europe and that 450 meters is now being attained.

This has raised the question of cap versus bobbin spinning, which somewhat parallels the pot-versus-bobbin-spinning controversy in the viscose field. Both systems are being used in the domestic plants, and the trend of development is not yet clear.

The recovery of acetone from the vapors which leave the spinning cabinets has received a great deal of attention. Absorption by activated charcoal, which has brought the loss of acetone down to 6% and less, is being replaced to a considerable extent in Europe by a process in which the vapors are absorbed by cresol.

In the acetate, as in the viscose process, the commercially successful plants are operating on what might be called the "standard" process; that is, the process which has been gradually developed from the principles which were evolved in the original dry-spinning patents. There is a great deal of work being done on more or less radical innovations, some of which may prove commercially practicable in the future, although not yet at that stage.

Among these are efforts to stretch the acetate yarn while spinning by maintaining it in a plastic condition by the use of swelling assistants or heat. In Germany persistent experiments with the wet spinning process are also being carried out. The original patents for this method are about as old as for the dry spinning process, but it has never attained commercial success—although laboratory work reported during the year has produced finer filaments of considerably greater strength than is being obtained by dry spinning today.

The ever-intriguing problem of how to spin the primary acetate in the wet state—thereby eliminating the saponification, precipitation, and re-solution of the secondary acetate in acetone—is apparently no nearer to solution than before. This is a bit of rationalization which will surely revolutionize the acetate-rayon industry if and when it arrives.

Cuprammonium and Other Processes

Because the production of cuprammonium yarn, which was developed to its present state in Germany, is still largely in the hands of one organization and its affiliated companies, there is little public information available as to the manufacturing developments of the past year. Equipment for making this type of yarn can now be purchased from several of the machinery builders. It is reasonable to suppose that the chief efforts will have been directed toward increasing the speed of production, the efficiency of recovery of copper and ammonia, and the reduction of the after-handling of the yarn in skein form. The present sharp depression in silk and rayon prices has put the cuprammonium process in a difficult position, from which it will only emerge successfully when the market swings upward once more, by a most rigid rationalization and reduction of costs at every possible point.

Nitrocellulose Process

During the year there were few new developments in the nitrocellulose process. The production of an opaque or dull-luster yarn by the addition of an inert material to the spinning solution, as already mentioned, has enhanced the value of this yarn in certain fields.

Textile Processes

The tendency of the rayon manufacturers to put the yarn up in package form has grown during the year. This has resulted in the development of machines to reduce the number of textile processes, such as a new cone winder which winds directly from a skein and a twister which twists and winds directly onto a cone.

One of the most interesting developments is that of an uptwister which will handle the 125-mm. bobbin at spindle speeds up to 10,000 r.p.m. Another is a three-deck twister, as well as a twister which has a decidedly new and novel method of overcoming the drag due to the friction of the ballooning yarn in air. This improves the speed of twisting and the quality of fine deniers.

Physical and Chemical Properties of the Yarns

So much for the actual manufacturing processes. What of the product itself? The year has developed certain decided tendencies or affected those which were already in evidence.

Among these is the movement toward finer filaments. Comparison of the tables compiled by Cox, Fuller and Mauersberger for June, 1929, and July, 1930, show that with one exception every domestic viscose producer has increased the filament counts of 150-denier yarns

during the year. The filament counts of other deniers have remained unchanged.

The diversity of viscose yarns produced has been increased by the addition of ten new numbers by former manufacturers, in addition to ten which are now being produced by two new companies whose plants have come into operation during the year. In the acetate field two new plants have also come into operation during the year, and these, together with new numbers now offered by older manufacturers, have increased the total range of acetate numbers offered from fourteen to twenty-four. Four numbers have been added to the nitrocellulose yarns, all higher filament counts of deniers already being manufactured.

Of the total of nineteen numbers added during the year, fifteen are 150 denier or finer. Nine numbers have been discontinued, six being 200 denier or coarser.

The vogue for subdued luster in fabrics has grown, and this has led to the production of subdued- and dull-luster yarns by many viscose manufacturers in addition to the opaque nitrocellulose yarn already mentioned. The natural luster of cuprammonium yarn is subdued enough to meet the vogue. Acetate yarns of this type have not appeared except experimentally, because this type is unique in that to a degree any luster desired can be obtained during the finishing of the woven or knitted fabric.

The usual processes which have been employed to produce yarns with permanently subdued luster involve the incorporation of an emulsion of an oil or fat or solid particles of some inert substance such as sulphate in the spinning solution. After-treatment of the lustrous yarn is usually less permanent, but a recent patent mentions delustering by abrasion. The yarn is drawn through loose abrasive powders such as kieselguhr, emery, glass, or alum, which are claimed to roughen the surface without doing excessive injury to the yarn.

The grading of yarn still lacks uniformity, in spite of the ostensible classifications of first, second, and inferior. There has been much discussion recently on this point. A straw which indicates perhaps the future trend is the adoption of one standard grade by a British viscose manufacturer, which follows the practice of the acetate manufacturers. A possible solution which has already been suggested would be to offer one standard grade; an inferior grade; and, at a premium, a specially selected grade called from the standard for the few purposes requiring exceptional perfection.

Dry and Wet Strength

Comparative figures on the strength, elasticity, and elongation of the various makes of yarn are not available, and random figures selected from the literature or from individual tests are of little worth for comparative purposes. Judging from the work of A. K. Johnson, published a few months ago in this journal, the strength and elongation of the different types of low-luster yarns seem to be generally less than that of the corresponding lustrous numbers. In general there has probably been a slight upward trend in both air-dry and wet strength and an improvement in uniformity. Some of the variations in strength, however, have likely been due to experimental adjustments of the strength-elongation relationship on the part of the various manufacturers in a search for the combination which gives the best results in the textile manufacturing processes.

Staple Fiber

The manufacture of staple fiber has quietly continued during the year. Here is one field in which the unusually strong Lilienfeld filament seem to find successful commercial outlet, probably because two of their reported weaknesses—namely, low elongation and uneven dyeing qualities—are overcome by the process of mixing and spinning. The outlets for spun-rayon yarns are, however, much more restricted than those for the continuous-filament variety.

It is interesting to note that in England one firm is spinning rayon staple fiber successfully at 126/2 (cotton count) on a mule frame with the number of broken ends comparable to cotton spinning.

New Processes

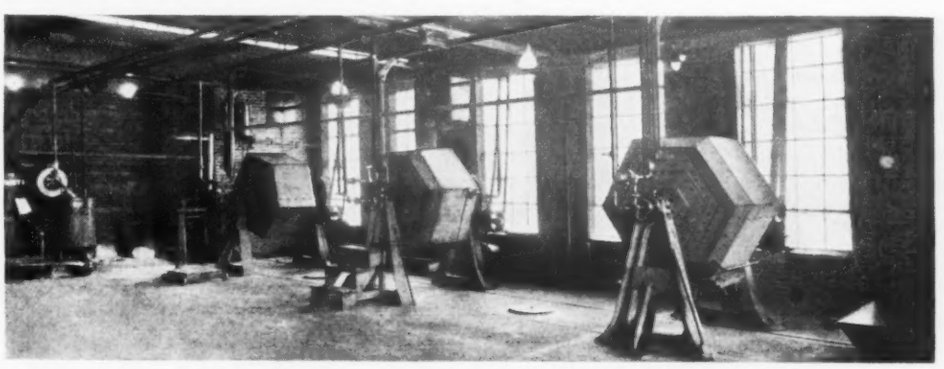
The year has brought forth news of new processes and further work on older ones which differ from the "big four."

It is reported that butyrate acetate is being spun successfully, but the various other esters of cellulose which have been prepared in the laboratory are either too costly or unsuitable for yarn.

The interesting properties of certain cellulose ethers have been known for some time, but no commercially successful process for converting them into yarn has yet appeared.

The papers have from time to time carried stories of new fibers and processes, such as a Swiss method of transforming raw cellulose into a colloidal solution without chemical destruction or alkali, a silk made from polymerization products of butadiene by spinning into very hot chambers, and a synthetic fiber newly invented in North Carolina which is still completely enshrouded in mystery.

Any one of these reports, or the ones which have preceded and will succeed them, may mean the seed of a radically new development which will change the whole course of the rayon manufacture. In the meantime, however, the industry is making technical progress year by year along those paths of steady and painstaking development which have been followed by every great industry.



Xanthate Ageing for Viscose Process Rayon

Rayon Enters Many New Markets Despite Off Year

DEVELOPMENT of new uses for rayon made important progress during the last twelve months. The chief trend was toward trading-up, toward more complete quality acceptance of rayon fabrics. Chemists, technologists and rayon stylists continued to recognize this phase as a vital element in rayon's progress.

In the field of woven goods, interest centers on rayon flat crepe, which has solidly established itself as a successful and favored fabric; with further improvements in yarn and in design, this fabric should grow more popular. Rayon had made important strides in all the broadsilk divisions of late; crepes, taffetas, all-rayon chiffons and shantungs are among the fabrics which have increased in significance. Shantungs with rayon warp and cotton filling, and shantungs with rayon warp and spun rayon filling won satisfactory consumer acceptance and are very promising for next year.

Rayon crepes are winning quality recognition. Last year these fabrics were inferior and used only for slips. During the current year they entered the dress goods field and manufacturers report a good demand both from cutters and piece goods buyers. Crepes now are being actively promoted in the Fifth Avenue district and in the higher-priced stores.

Linings Important

From the point of sales, men's wear linings now represent an important market. It is estimated that 6,000,000 to 7,000,000 lb. of rayon will be consumed by lining manufacturers during the current year, and the possibilities of the market are considerably greater than this. Technical improvement in yarn and a better understanding of how it should be handled in fabric manufacture, permit of steady progress toward wider acceptance of rayon among makers of linings for men's suits in the medium-price field.

Cotton warp, rayon filled crepe has been well received. It is going extensively into the manufacture of blouses and underwear. The 150 denier multifilament yarn, standard construction 80/76, makes a fabric particularly suited to the manufacture of women's and children's dresses; these have sold well in the current fall market.

Rayon as Decorations

In the decorative field, rayon prints are important, and are winning popularity in the higher-priced trade. The demand for casement and cretonne weights and heavy-weight slip covers, made from multifilament and low luster yarns, is increasing, both in the decorative and the dress goods fields. Last year low luster yarns were outstandingly important in knit and woven apparel fabrics. The demand at this end continues, but these yarns also promise to become popular for drapery production. Another new development is the cotton and spun rayon cloth which now competes with mohair for use as a casement fabric; the cotton and spun rayon fabric is reported selling well for hotels and offices.

In Knit Goods

There are several important trends in the knit goods field. Distributors report a strong consumer demand for rayon knit goods which will be run-proof, and this problem is occupying the attention, both of yarn producers and knitters. In underwear, the rayon producers have been moderately successful in getting knitters to use the finer deniers. Up to date, 150 denier has been outstandingly important for knitted underwear, but when the finer sizes were reduced in price this year, consideration was given to the possibility of improving the quality of rayon underwear by the use of 125s and 100s. Some difficulty developed, as knitters found certain mechanical problems involved in the change. The producers sent out technical experts to the mills to explain how the finer deniers could be used for underwear, and this service has resulted in a slow but definite turn toward the finer deniers. The knitters first tried 125s and gradually swung to 100s; the change was so satisfactory that during the last two months, some underwear mills did not try 125s, but went directly from 150s to 100s.

French Designers Aid

Important work toward winning quality recognition for rayon in the underwear field, was done by the Rayon Institute during the year. Ernest L. Starr, then director of the Institute went abroad to confer with European rayon producers on organizing a similar body over there. While in Paris he made contacts with two well-known designing firms, Philippe et Gaston and Suzanne Tarbot, as a result of which these designers made a series of original underwear models in rayon which they permitted to be copied free by an American firm, with the aim of stimulating interest in rayon fabrics. The fabrics used were 100% rayon, of a Milanese-like knit, and last fall copies were introduced in the American market by Harry

P. Eckstein, Inc., which firm was given exclusive rights. The effort proved successful in helping to win better recognition for rayon in the quality field. The underwear was placed in American stores and sold by the hundreds. The French prestige of the designers, the beauty of both garments and fabrics sold combined to appeal to discriminating buyers and the garments sold at higher prices than average rayon underwear, thus helping to achieve the desired trade-up. Other new markets which the Institute helped to develop included rayon as a footwear fabric and rayon fabrics for baggage.

During the months that have elapsed since the Institute ceased its promotional work, some doubt has been expressed in the trade as to the wisdom of this action. Certainly it would seem that there is still room for further concerted promotion of rayon, especially as regards educating the ultimate consumer to rayon's characteristics and uses. Even allowing for the extensive and efficient work being done individually by rayon producing companies—and this work has been excellent—there still remains a big gap in educational service, a gap that was competently filled by the Institute. The implication behind the move would be that there is no further need to familiarize the public with rayon, with its new uses, its improvements, and its constantly widening field. Such a theory would appear, on the face of it, to be fallacious.

Rayon has made progress in the domestic fabric field, both as a decorative yarn and as a self-fiber. Turkish towels made of rayon, were one of the recent developments, which opens the way to a broad line, including all towellings, and wash cloths, etc. Woolen blankets, tastefully decorated with rayon facing, also attracted attention this year. Rubberized goods, including a wide range of raincoats, were another novelty.

Producers are satisfied with the progress made this year toward developing broader markets for rayon. The consumer response was good, considering the general industrial depression and the general hesitancy to buy; and the trade looks to 1931 to see these new uses register their real results in sales of yarn.

Rayon Increasingly Important in Cottons

STRICTLY speaking, few new rayon cloths have been marketed by the cotton mills this year. There has been any amount of experimental work carried on, but the bulk of the sales have been accounted for by the older standbys such as the rayon flat crepes, taffetas and twills. There was no lack of effort on the part of mill men in carrying out new ideas, but the price decline of raw silk, and consequently of silk fabrics, seriously curtailed the possibilities of merchandising new types of rayon-cotton combinations.

New developments very probably have been of a much wider scope than in previous years, but those connected with their development have been reluctant to talk about them prematurely, fearing to intensify the already keen competition.

One interesting fabric, which offers significant possibilities, is an all-rayon shirting. The silk shirt disappeared some years ago, but the recent spread of men's rayon underwear and polo shirts may awaken an increased desire for elegance in outerwear once again. No finished garments made of this fabric have appeared as yet, but one of the larger shirt manufacturers is carrying on experiments in a quiet way.

As shown, the shirting was made from low luster yarns, a balanced construction and composed of 150 denier warp and filling. The finish and handle would have to be changed considerably before it would appeal to the average wearer, but this is the next step in correction, according to the maker. A different finish may produce a softer hand, but it is admitted that finer deniers may be the ultimate solution.

The vogue for rough weaves brought out several canton crepes made from synthetic fibers. Cotton mills developed these along somewhat different lines than the broadsilk weavers. The latter had worked with 150 denier warp and filling and also with 150 denier warp and 100 denier filling. Cotton men evolved a very successful cloth with a 150 warp and 300 filling.

All-rayon georgettes showed signs of coming to the fore, but in the early summer ran up against the all-silk competition. As the georgettes are necessarily made from the finer deniers they were among the first to feel the influence of depressed silk prices.

A few people have samples of spun rayon cloths and are looking for an interested manufacturer. It is possible that the drapery trade holds a good future for cloths of this type. The most noticeable feature of one such fabric under observation was the excessive weight of the goods. To the casual eye, the weave and feel gave it some semblance of a worsted dress material, but the weight was far greater. This characteristic, however, would seem an advantage in a drapery, enabling the goods to hang in soft, but definite lines. The wearability of an all spun-rayon cloth is a moot question, but would not bulk so large in a drapery cloth as in a dress fabric.

Cotton-filled damask drapery materials took a decided boom during the year. So much so, that at the present time it is stated that the southern mills are unable to give deliveries before December. The most popular type has been the 50 in. fabric with an approximately 12 in. pattern. The increased consumption, in large part, has been accounted for by the trend in bedroom decoration. The unit idea of interior decoration is more pronounced than ever, with the swing toward heavier fabrics rather than flimsy boudoir types. The ensemble has been carried out with draperies and bedspreads of the same material and design in the same or harmonizing colors.

In a less topsy-turvy year, the efforts of the cotton mills would have been more noticeable. As it was, a general sinking of business, declining silk prices and a delayed revision of rayon yarn quotations nullified a good deal of the work.

When the Cotton Mill Adopts Rayon...

Winding
Warping
Designing
Weaving

By Philip Allen

RAYON is usually received at the mill in cases which hold between 200 and 240 lb. In these cases the rayon is put up in 10-lb. bundles. Each bundle is wrapped in paper, thus preventing roughing of the individual filaments.

In ordering yarn, the mill should insist that the manufacturer ship from one plant. If this is not done, there may be streaks in the finished fabric that the finishing plant will be unable to remove. This means a lot of cloth turned back to the mill. Therefore it is good policy to keep the rayon from one plant separate from the rayon from another plant of the same company.

In the mill with which the writer is familiar, the rayon is given out in 10-lb. bundles. Each kind of rayon used has a separate tag, which is punched when the yarn is delivered. Each kind of rayon also has a different color on the top of the bobbin used. This prevents mixing of the yarn.

Precautions in Winding

In winding rayon, care should be taken that the skeins are opened carefully. Rayon has very little elasticity. The threads will stretch considerably, but have practically no power of contraction, so the operator should use care in putting the skein on the swift.

All the bands should be cut with some sharp instrument, preferably scissors. They should never be broken with the fingers, as such a practice is likely to make stretched and weak places in the thread. This will cause excessive breakage in winding and weaving.

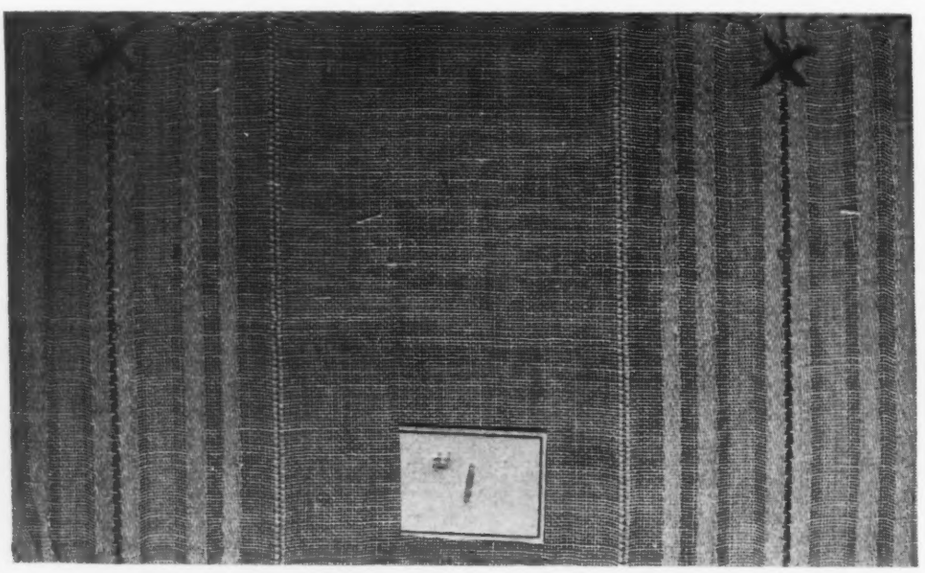
The tensions on the swifts should be kept even at all times. Uneven tension will help to cause shelling off if too soft, and stretching if too hard. It is also essential that all guides be smooth. Rough guides cause broken filaments. Broken filaments in turn cause excessive breakage in weaving.

Strict attention should be paid to tying the ends. The knot should be as small as it is possible to make it. The ends should be cut close to the knot. A large knot will cause many warp breaks that are easily avoided if watched.

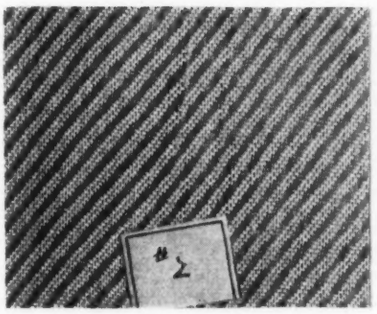
Broken filaments are likely to form bunches between the harness and reed. Therefore, when the winder tender is doffing the bobbin or putting in a new skein, it is a good policy for her to inspect the bobbin or skein for excessive broken filaments. Each operator should have her own pin board for her bobbins. When the board is filled, she should put a tag with her name on the board. This is a very good method of finding out who is responsible for bad bobbins.

Ten Winding Rules

It has been found that the rules given below are excellent in operating a winding room successfully, and



Cloth 1. Rayon at X was successfully run from same beam as remainder of warp



Cloth 2. Twill lining

should be followed out by the overseer in charge of the room.

1. When opening a new case, the lot number should be put down immediately. This minimizes the danger of mixing different lots.

2. The winder tender's card should be punched each time a bundle of rayon is given out. This balances the amount opened with the amount wound on the bobbins.

3. A differently colored tag should be used for each kind of rayon. This helps to prevent mixing of brands.

4. Keep clean waste off of floor, for rayon waste is worth money.

5. Do not break cases, for these may be resold.

6. Have the winder tender's name on all boards filled by her, thus placing the responsibility for bad work where it belongs.

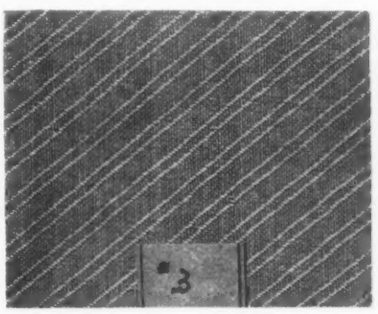
7. Keep all bobbins off of floor. Some one is liable to step on one.

8. Keep all tie bands separate from rayon waste. There is a difference in the selling price of the waste.

9. Rewind all imperfect bobbins. Bad bobbins in the weave room cause the weaver to lose production and make seconds.

10. Have winder tenders keep their machines and hands clean and free from oil. Oil on rayon will not readily come out when dyed.

If the overseer follows these rules, he will discover a big improvement in his room.



Cloth 3. Twill lining

Economical Warping

The most economical way to handle rayon for warping is from a cone to the warp. The first method was to buy the yarn in skeins. This had to be reeled on to spools. Then the set was put in a so-called "silk" warper, which was often nothing more than an ordinary cotton warper changed over. This caused uneven warps by uneven tension on the spools, and small production.

The new way from a cone to the warp does away with the old system. Manufacturers of creels have developed special guides which tend to keep a balanced tension on each strand. With the old method there was no way of keeping an even tension. The new creels are usually of the magazine over-end-draw type. This provides a continuous run of rayon.

Rayon is made up of many fine filaments which break and fray very easily. Therefore it is very important that the yarn be handled with care. The eyes of the drop wires should be so finished that they prevent breaking and fraying of filaments.

The drum should be covered with some material which will give a gripping surface, so that when the brake is put on it will prevent slippage between the drum and the warp. This also prevents possibility of lost ends.

On the new high-speed rayon warping, the machine is brought to high speed gradually. This helps to prevent stretching and breaking of the filaments. This is true in stopping. The warper should not be stopped with a sudden jerk because it has a tendency to rough the individual filaments, giving the warp a fuzzy appearance.

On the old so-called "silk" warper, about 40 yd. a minute was the average speed. On the new high-speed rayon warpers, one machinery manufacturer has obtained speeds in excess of 150 yd. per minute with good results, the silk used being 450 ends of 150 denier. This was with the new over-end draw from cones.

Summing up the new high-speed warping, it will be found that lower cost, less waste, more even tension, and even density result. This in turn tends to make better loom operation and fewer seconds in the cloth room.

Sizing Rayon

In sizing rayon, the size should be of a nature especially adapted to it. The ordinaray size used in cotton mills will not work on rayon because it does not penetrate the thread. It covers only the outside of the yarn. When the beam is placed in the loom and the operator starts to weave it, this surface coat will break off, leaving no size on the yarn. The main idea in sizing rayon is to strengthen the yarn and make the filaments adhere to each other. Thus the yarn should be better able to resist the chafing of the loom harness.

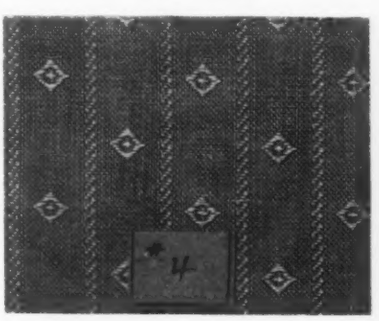
Most all of the preparations use gelatine or glue, although starch may be used if made soluble by Activin or diastatic compounds. These preparations are usually sold in concentrated form and may be diluted with water to suit the yarn ends.

Special care must be taken to have the loom beam well balanced and the yarn run on evenly. Flanges are very often used when the rayon warp is made at the mill. When the yarn is bought ready for the loom (on beam barrels belonging to the mill) a paper is inserted about every 100 yd. This keeps the yarn even in tension. If a thread has been taken around the warp, it comes to the paper ahead of the yarn that has not been broken and can be straightened out.

Designing and Weaving

When rayon is woven in a plain or box loom previously used for cotton goods, the settings, relative to the contact of the yarn with the moving parts of the loom, are carefully checked so as to eliminate friction as much as possible. The loom should usually be run at a slightly lower speed than when cotton is used alone.

The back whip roll is often dispensed with when the yarn is on barrels, and the warp is raised so as to have the yarn delivered to

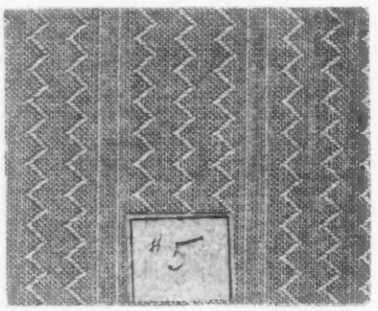


Cloth 4. For back of men's vests

the stop motion and the harnesses in a straight line. It is often advisable to start up with a cotton warp and twist on the rayon warp when ready. This saves waste of rayon when the warp is started up.

The harnesses must have the eyes even and the wire smooth. If the sley is high, it is better to use extra harnesses than to crowd the heddles on all-plain weaves.

The reed used on crepe yarns (rayon warp) is generally all metal and fitted in a wooden case. The dents per inch are a little higher than for cotton voiles. When a regular reed is used, it should be carefully selected. The wires should be flexible, and the spacing should be 60% to 75% to reduce chafing of the yarn. The shuttle race should be covered with felt, and the shed made a trifle higher than usual. When the shuttle passes over, the rayon will not be rolled, but will sink into the felt.



Cloth 5. For back of men's vests

Rayon warp yarn may consist of as many as 60 filaments. If any of these filaments are broken, they will become bunched between the stop motion and the harness, or in the shed behind the reed. If allowed to increase in size, they will become entangled with adjacent threads, causing imperfections in the weave.

For all-rayon satins it is advisable to use the warp-face weave in preference to the filling-face weave and to have a narrow tape selvage, two and two picks. This is in order that the weaver may see imperfections on the face of the cloth. Misweaves or other defects cannot be readily seen when the cloth is woven face down.

When Rayon Runs from Spool

When a lower number of ends are run on a top spool, as in shirting goods, there is a high percentage of the warp woven on the face of the cloth. The harness is raised to have the rayon yarn higher than the cotton yarn in shedding. This keeps the rayon ends away from the cotton ends when the rayon is not weaving into the cloth.

The top spools are often woven too tight, as the tension is hard to regulate. In such cases the rayon threads will break when the cloth is stretched during the finishing.

Rayon yarn will not resist as many visits to the laundry as cotton yarn. Shirtings with a cotton weave under the rayon stripes will therefore wear longer than those with all-rayon stripes.

The rayon for top beams is sized in the skein and put on light spools ready for the warper. Where both acetate and a regenerated-cellulose rayon are to be used, a fugitive tint is put on the latter type in the sizing so that the two may not become mixed.

If a very few ends of rayon are used, they can be run on a warp along with the cotton. As the take-up is shorter than in cotton yarn, the rayon already sized can be run in the front of the slasher in the same way that ply cords are often put on one beam with single yarn. If tensioned separately, they can be run in the slasher in the regular way.

Cloth No. 1 with rayon at *X* was run successfully with the satin stripe on the same beam as the remainder of the warp. A slack weave was needed for piece mercerizing.

Most of the rayon used in weaving is wound as filling yarn. There are several makes of rayon and also many grades of each kind. The buyer or broker often states which kind or grade he wants and inserts a clause to cover any defects over which the mill has no control. There is nothing definite about this, and the goods are made and graded as though it were not there.

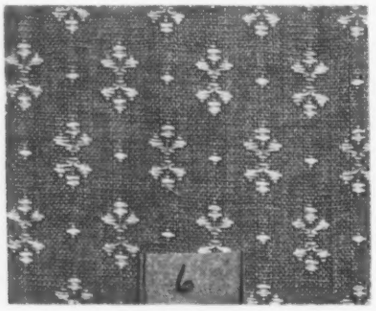
Often there are a few kinds and grades to be woven at the same time. To prevent them from being mixed, a distinguishing mark must be made.

The filling is delivered to the mill on paper tubes as cops if it is bought ready for the loom. The tubes have the initials of the firm printed on them, and the paper is of different colors. The shipping of rayon as cops is similar to the shipping of regular silk; that is, in envelopes with pockets to separate the cops. The tubes are seldom used more than once. The diameter of the tube is specified when the order is given.

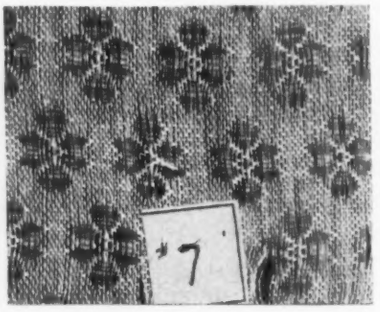
When the rayon is wound at the mill, it is put on shellacked bobbins and doffed on pin boards. The weaver places the empty bobbins back on the pin board, and they are taken back to the winding room ready to be refilled. A ring of colored enamel on each bobbin tip will show the kind of filling. Colored loom tags to conform to the color of the bobbin prevent any mixup, as the man in charge can see if the right filling is being used.

The grade of rayon used is a serious problem to the weave room and the cloth room. They cannot eliminate "shiners" or broken filaments which are in the filling when delivered to them. As these defects are hard to trace to the source, there should be some team work between the overseers of weaving and winding and the superintendent or purchasing agent.

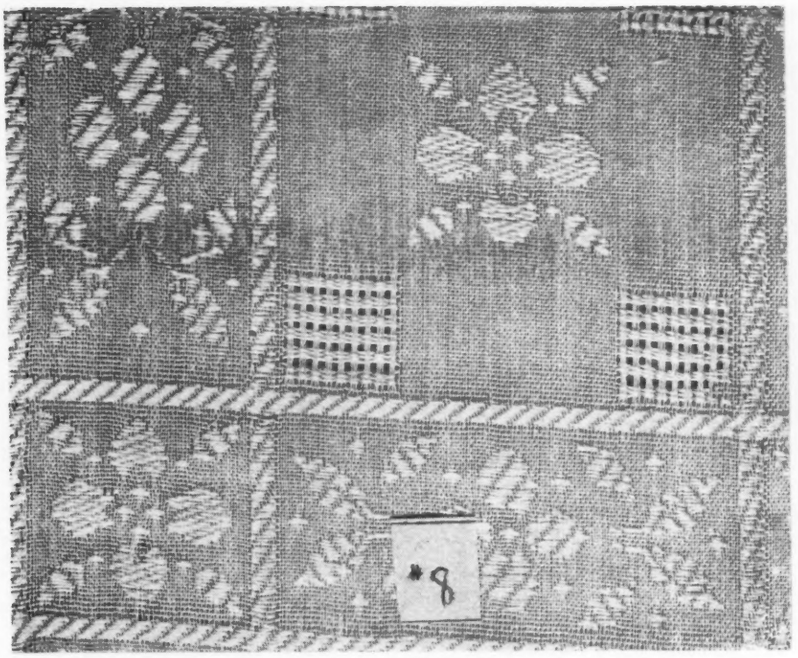
The shuttle boxes must be kept clean. They are lined with leather, which can be renewed if dirty. Oil spots



Cloth 6. All-over effect



Cloth 7. All-over effect



Cloth 8. Jacquard effect with mock leno and figure

or shuttle marks cannot be washed out; they contribute to seconds in the cloth room.

Alpacas and Sateens

Rayon alpacas and sateens with cotton warps are run at the same speed as regular cotton goods. The shuttle used is larger than a "silk" shuttle, but has the same tension regulated by a rubber band. It is threaded with a metal hook and complies with the standard of hand threading.

With a lining of hide inside the shuttle at each side, the fur prevents the yarn from over-running at the end of the pick, thus preventing slack yarn in the shed. The spindle is solid and has a spiral recessed; so that a paper tube of the right size, when given a slight twist as it is being put on, will not come off very easily. For bobbins the usual catch is required in place of the spiral, and the spindle can be of the ordinary kind.

Rayon filling does not give way to the warp, in contraction, as much as cotton filling, so the reed to be used to get correct sley and width will be a little higher than usual in dents per inch. Rayon-filled alpacas will contract about 3½ to 4%. This will vary according to the denier of the yarn or the number of filaments when using the same weight of deniers. Soft 60-filament rayon will contract more than the stiffer 24 filament. The cloth must not be too narrow. It cannot be stretched as much in the finish as all-cotton cloth. New reeds will therefore be needed when starting on this line.

Rayon-filled goods other than plain weaves are used for linings, overdraperies, bedspreads, etc. They range from light to heavy goods, but the tendency is to use as little rayon as possible. The increase in the price of the goods with a few picks added is often ruled out in favor of lower picks. Linings are principally composed of twills or stripes. The pattern has as much rayon as is practical on the face. These goods have to resist abrasion and take the place of heavy satin goods. The filling floats are short.

For twills the count is lower and an eight-harness weave, $\frac{1\ 1}{5\ 1}$, is often used.

Cloths Nos. 2 and 3 are twill linings.

Cloth No. 4 is a pattern often used in various layouts and seen in the back of men's vests.

Cloth No. 5 is along the same line, using laid cords and figure.

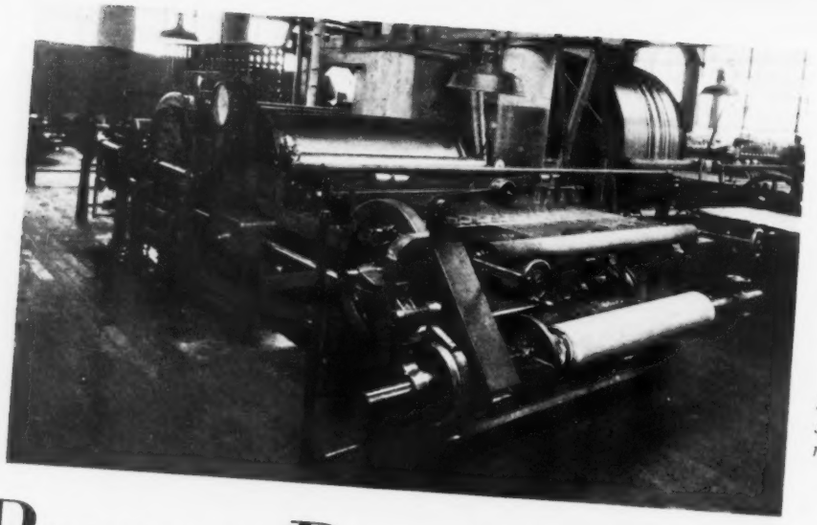
Cloth No. 6 shows an all-over effect with the filling floats as high as seven. Longer floats are allowed when the cloth has to be "showy," but such cloth is not handled roughly and is seldom cleaned. Pattern No. 7 is one of this kind, low sley and pick and easily frayed or pulled out of line. Such cloth must be handled carefully in the weave, cloth, and finishing rooms to be salable.

Jacquard figures are made with long filling floats. Some of these goods seem too frail to be of much use, but they sell in quantities much larger than is the general run for colored cotton goods of one pattern. The floats are over ⅛ in. for the longest, or equal to silk-filled goods.

Curtain goods will sometimes have the five-end mock-leno effect. This weave has some advantages over leno, being cheap and easy to make. Bedspreads are made with coarse yarns and 300-denier colored rayon for filling. They are dry-cleaned and have a good appearance.

Cloth No. 8 shows a jacquard pattern using mock-leno and figure.

Cotton mills are having considerably less difficulty in handling rayon than they had a few years ago. The reasons lie both in improved methods and improved yarn. There are still, however, many opportunities for trouble, and Mr. Allen explains how some of them may be avoided.



Equipment for sizing rayon warps

Present-Day Methods of Rayon Sizing

By Arthur K. Johnson

DESPITE extensive improvements in the inherent qualities of rayon, it still is a sensitive textile material, requiring skill in handling and up-to-date machines and methods for processing. Owing to the great variability in demands made of it by cloth constructions and uses, and to the diverse conditions to which it is exposed in different consuming manufacturers' plants, the use of rayon continues to be very much of an individual problem for each handler, with no single, universal formula for treating available. Hence, it presents many interesting and important problems.

The sensitivity of rayon is shown by its behavior when subjected to certain physical and chemical conditions. It may be affected by variations in the degree, uniformity, or rate of change of the following conditions either singly or in combination: (1) Moisture or wetness of atmosphere and of fiber, such as relative humidity of the air, and regain, bone dryness, or saturation of fiber; (2) Heat, and especially elevated temperatures; (3) Tension; (4) Mechanical damage from cutting edges or abrasive surfaces; and (5) Torsion or twisting.

The effect of changes in condition on rayon yarn as observed in practice include variations in physical nature causing stiffness, harshness, lack of permeability or absorption, and dullness of luster; variations in denier size induced by stretching, which gives uneven yarn and results in lowered plasticity and strength; variation in the surface or filaments, such as broken or cut filaments and yarns; and variations in the positions of filaments or yarns producing slubs or catches, changes in shape, covering power, and luster, reflection, and twist.

There are numerous methods employed in practice to reduce the harmful effects of these variations in conditions and thus produce satisfactory results. Among these methods the practice of sizing holds an important and interesting position.

Speaking generally, sizing for weaving accomplishes its purpose by the incorporation of harmless foreign material (sizing) with the rayon yarn. This sizing may consist of materials making the rayon less sensitive to moisture and moisture changes; those reducing its frictional values by lubrication and/or by the presence of smooth coating films; materials which increase the unity of filaments and persistence of shape of yarn by the formation of cohesive films which cement the filaments together; and others for improving the mechanical strength or tenacity of the rayon.

The methods by which the desired results of sizing are brought about differ greatly in detail. They vary in the types, concentrations, and temperatures of sizing materials; in the time of processing; and in the method of application of the size. Their selection is regulated closely by the type, denier size, and condition of the rayon; by the equipment and experience of the operators; and by the conditions which must be satisfactorily met in the sized rayon in connection with the cloth construction; previous and subsequent processing of yarn in dyeing, winding, warping, and weaving; and of the later treatment to be given the cloth in desizing, dyeing, and finishing.

Thus, acetate rayon, since it has low absorbency and high water resistance, requires far different treatment than the more absorbent regenerated-cellulose types. In fact, nitrocellulose, cuprammonium, and viscose differ among themselves in properties—the vision types probably being the more absorbent. Large sizes of rayon or coarse filaments, with their relatively high strengths, are easier to handle than are fine sizes or multi-filament yarns with their lower gross strengths and correspondingly greater susceptibility to stretch with the same tension.

Conditions of the rayon influencing its absorbency, softness, and elongation—such as oiliness, high twist, and desulfuration—also increase the difficulty. Yarn-dyed rayon is more sensitive than undyed yarn because of the danger of color alterations or bleeding at warm

temperatures. Dense cloth constructions are harder to size than those which are less dense, and the problem of maintaining softness in dry-finished fabric where the sizing is left in is greater than in the case of those fabrics which are wet finished.

There are several methods of sizing in common use. These are: (1) Skein sizing; sizing during packaging, as in winding or coning; and on the perforated package. (2) Spool-to-spool sizing during the transference from one package to another. (3) Creel-to-beam sizing during the making of the warp. (4) Warp sizing on the completed warp while winding from one beam to another. (5) Spray or wax-roll sizing on the completed warp while weaving in the loom.

Materials Used in Sizing

There are three general types of materials available for use in sizing. The first type is employed to give lubrication, softness, and moisture-resistance. It consists of emulsifiable or emulsified oils and fats which have been treated by sulfonation, by partial saponification, or with chemical emulsifiers; oxidizable or blown oils or fats, including coconut oil, palm oil, stearic acid, and linseed oil; and plain or partially saponified or emulsified waxes, such as paraffin, japan wax, beeswax, carnauba wax.

The second type is used to obtain cohesion of filaments and also stiffness. This comprises solid fats, waxes, oxidized oils and resins; soluble or insoluble soaps; carbohydrate material, such as oxidized or thinned starches; starch acetates, and gum arabic; vegetable gums and vegetable proteins including gum tragacanth, carob-bean extract, moss extracts and their derivatives; animal proteins, such as glue, gelatin, and casein; and organic lacquers.

The third type is also used to impart softness and is usually employed in conjunction with the second group. It consists of liquids and/or hydroscopic agents, such as glycerin and glycerin substitutes.

By judicious selections of these and other materials, sizing mixtures may be made up, producing—as conditions may require—sizes varying by degrees from soft to stiff, from light to heavy, from penetrating to coating.

For example, in skein sizing by immersion or by spray-saturation methods and in sizing during winding by wet-roller or wick contacts sizing materials must be used in such concentration and at such temperature that the maximum lubrication, softness, penetration, and filament cohesion may be obtained with minimum thread adhesion. Again, for package material the solvent should evaporate rapidly from the package. In general, the sizing of materials employed here consist of emulsified fats, waxes, and soaps in water or in organic solvents, with surplus solution and solvent removed by draining, air blowing, or suction, and drying. For skein sizing by immersion, dilute solutions of starch derivatives or of animal protein, oil softeners, and glycerin are used, as are also vegetable gums or emulsions of oxidizable oils, resins, or resin soaps.

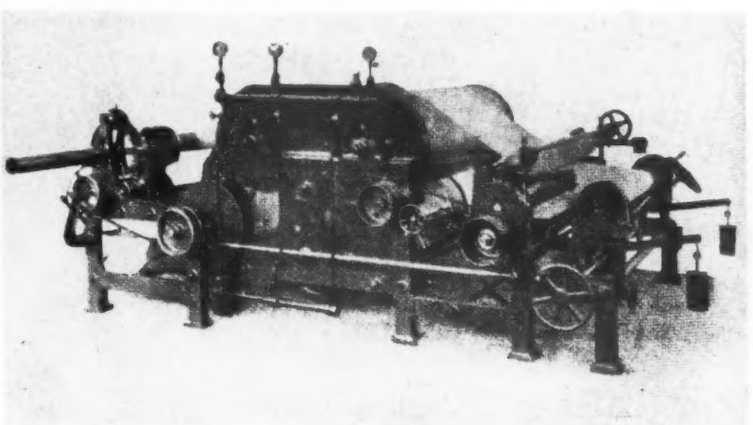
Concentration of Sizing Bath

Two methods of expressing the concentration of the chemicals in the sizing liquor are in use. One method states the weight of original sizing chemical in its relation to the weight of the air-dried yarn to be sized. This method implies the use of a fairly definite and constant ratio of the volume of liquor to the weight of yarn. In view of the belief that in skein sizing, unlike dyeing, the fiber takes out little of the chemicals by so-called "adsorption" (that is special attraction to itself whereby the concentration of the residual solution would be altered), but largely by simple "absorption" (sponging up or filling of the pores and surfaces of the fiber with solution of the same composition as the bath), this method of expression and the action following it may lead to variable results in different-sized lots. The variation is due to the fact that the controlling factor in this work is the concentration of the solution actually used and not the ratio of chemicals to fiber.

Experience shows that the volume controls are liable to be inexact, in practice, so that while the standard weight of chemicals for the given weight of yarn may be used, the quantity of water may be noticeably larger or smaller than usual. In this case, the size solution will be either too dilute or too concentrated, and the yarn will be too weakly sized in the first case or too strongly sized in the second. Additions of size for a second bath in making up the loss of liquor in a standing bath may increase or decrease the sizing concentration of the final solution too much, and again lead to variations in results.

What appears to be better practice for securing more regular results in successive lots is to express and use size solutions based upon the concentration of the solution; that is, to employ those based upon the ratio of size chemical to liquor for both the original bath and for make-up portions (assuming of course that dry yarns are entered into the bath). Using this method, a 10-lb. lot could be sized in a quantity of solution enough for a 1,000-lb. lot, and practically similar results would be obtained in the yarn as with a much smaller volume.

The time of immersion and movement of the yarn in skein sizing in general probably need not be much greater than that required to wet out or saturate the entire skein. While a longer soaking time might give somewhat more



Rayon warp-sizing machine.

of a swelling of the fiber substance and a bit more penetration of the size into its interior, sufficient action usually takes place during the time of wet standing for hydro-extraction, during extraction, while being arranged for drying, and while approaching dryness. The results of machine warp sizing appear to bear out this idea.

The temperature of the sizing bath is important for several reasons. First, the temperature must be so regulated as to keep all of the ingredients thoroughly fluid, and thus insure penetration of the materials and proper swelling of the fiber. Next, low temperatures are required to prevent fugitive colors from bleeding excessively. Again, the size must not be too hot for the workmen to handle. Finally, the temperature must be maintained low enough to avoid injury to the luster of acetate-rayon yarns.

Reaction of the bath as regards its acid or alkaline nature, is important. Acetate types of rayon should not be treated with strongly acid or alkaline solutions.

Improper methods of handling the skeins during the sizing operation, and especially their rapid lifting from the bath for draining, may cause impairment of winding quality by tangling the threads on the bottom end of the skein. Slow withdrawal, which allows plenty of time for the draining liquor to assist the threads to arrange themselves properly without undue compressing motion and weight, will be helpful. Better still is the use of a light rod and a small amount of tension on the lower end of the skein when removing the skein from the bath and while the lower half of the skein is still immersed in the liquor. This aids in re-establishing and holding the threads in a correct position, and leaves a better skein condition which facilitates winding.

Extraction of the surplus size solution in the saturated skeins should be uniform and thorough, but not excessive. Too long or too rapid a centrifugal extraction, notably for soft sizes, may cause the removal of too much sizing solution. Incomplete extraction, on the other hand, leaves irregular quantities of surplus solution which collect at the bottom of the skein while hanging during drying. Both conditions aid the production of unevenly sized skeins.

Precautions in Skein Sizing

Hanging skeins should be turned occasionally during drying. Wet-processed skeins can well be opened out carefully after centrifugal extraction. In drying, a light, smooth tension rod inserted in the bottom of the skein helps to reduce the curling and tangling of the bottom layers of threads.

Skein sizing, while commonly employed, is in general a relatively slow, expensive, and unsatisfactory process for stiff weaving sizes. Because of its unevenness, skein sizing may cause damage to yarn in winding and breaking up of size before weaving.

Sizing substances or solutions may be supplied to yarns while being transferred from spool to spool. The elements of chief interest here are careful reduction of tension on the wet yarn, the method of drying, and compensating drive for uniform speed. Spool-to-spool sizing is expensive, but gives a uniformly sized and well-shaped yarn. Hot-plate drying may give entirely different results from warm-air drying with the same formula when the size contains fusible ingredients, the former method of drying causing more melting and penetration and subsequent cohesion (and possibly stiffness) on later hardening.

Individual-thread sizing systems are available also where the yarn sheet is sized during the time of coming from the warping packages and going to the beam. This introduces a wet operation and a drying operation in building the warp and requires a special set-up.

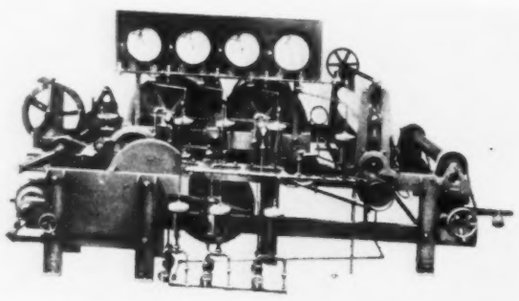
Warp Sizing

Full warps are economically sized on warp-sizing machines. Both the cotton slasher and the silk types are used; and there have been developed recently a number of warp-sizing machines designed specifically for rayon. Careful attention to tension on the wet yarns must be paid, and the regulation must be increasingly nice for increasingly finer deniers of rayon. Stiffening sizes containing glues, starch derivatives, gums, etc., which give solutions of slight to medium viscosity, are most successfully applied on the machines. Highly viscous solutions, as a rule, are not conveniently and uniformly applied to the yarn. The solution should have good carrying power on the supply roll, should wet out the yarn readily, should give filament cohesion, but should not cause the adjacent threads to stick together, and should yield flexible yarn with a non-dusting, non-brittle, and moisture-resisting size film. Such conditions are most easily met in the dilute water-solution type of size. The drying of the wet yarn is important, it being customary to dry in stages of varying temperatures, but to use no more heat than is required to thoroughly dry the sized yarn.

Acetate yarns differ in their absorbency, and therefore require special formulas of much higher concentration than do the other types of yarns. Otherwise the mechanics of their sizing is not particularly different from that of the regenerated-cellulose rayons.

There remains to be considered one other general method of sizing. This method appears to be coming into more general use for soft, light, lubricating sizes on silks and rayons. The method employs soft "wax" rolls placed in slight dragging contact with the top and bottom of the otherwise unsized warps in the loom. As the warps unroll from the beam in weaving, the threads receive without wetting a slight, partial coating of lubricating size which reduces fraying or breaking and harsh yarn.

From this brief description of the various methods of sizing and materials available for sizing, it can be seen that there is much leeway for individual choice in the selection of method, in investments for apparatus, and in character of results obtained in sizing, and also that each user of sized rayon may have a solution to his problem based upon his own art, experience, and demands.



Warp sizer for rayon

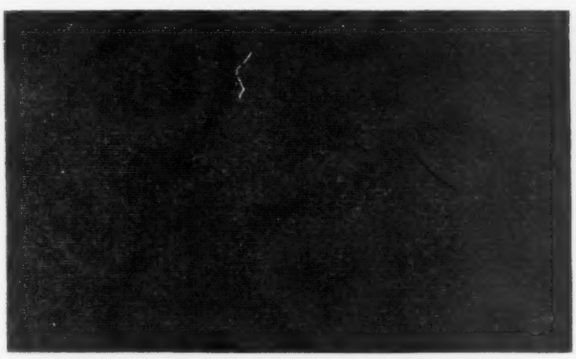
Progress in

The Rayon-Fabric Field

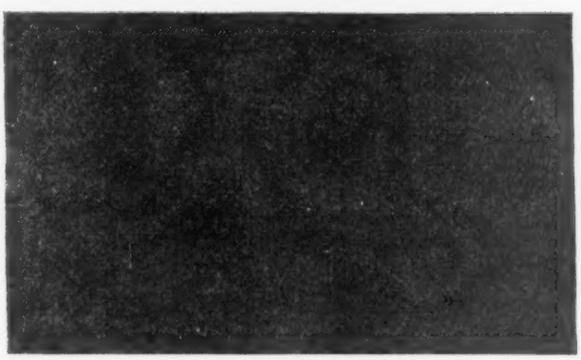
By James Chittick

IN THE manufacture of rayon fabrics, the progress made recently has been astonishing. Standard silk-fabric constructions have been duplicated so cleverly, both in fabrics in which synthetic fiber is the sole material used and in those which are partly composed of real silk, that even experts frequently find it impossible to pronounce off-hand whether or not the fabric is all silk. In addition to the success that has been achieved in this direction, there have been produced many novel and beautiful fabrics that could not have been made of materials other than rayon. These successes have been made possible by the high state of development to which the manufacturers of rayon have brought their art in the production of yarns of finer, and still finer, sizes; to the development of yarns of different degrees of luster, running from those of high brilliancy, to others which are comparatively lusterless; and to the development of yarns modified in aspect and handle by the varying degrees of twist imparted to them.

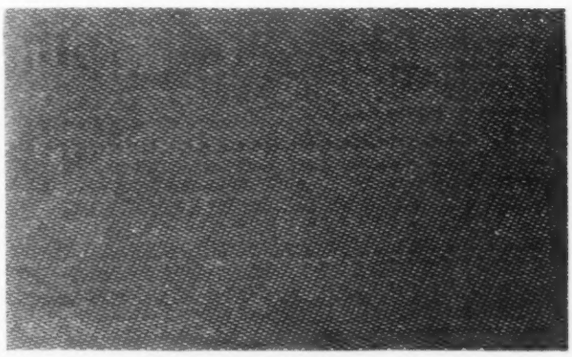
Credit should also be given to the sales agencies of these producers, which, by the employment of expert technical service coupled with clever styling, have had produced wide ranges of fabrics in which have been employed silk-and-rayon mixtures, rayon alone, and combinations of these materials with cotton, worsted, spun silk, and other yarns. Few manufacturers, even those who make extensive use of rayon in their productions, have any real appreciation of the wide variety of attractive fabrics that can be brought into being by the use, in whole or in part, of the various sizes and kinds of synthetic fibers that are available. The sales agencies of the rayon manufacturers therefore are performing a real service to the trade in having such fabrications made as have been referred to.



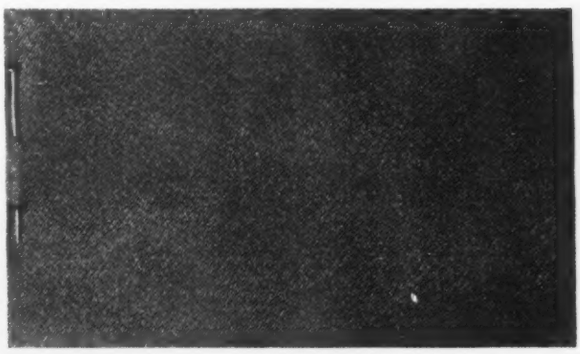
Sample A. A blue taffeta.



Sample B. An eight-shaft satin.



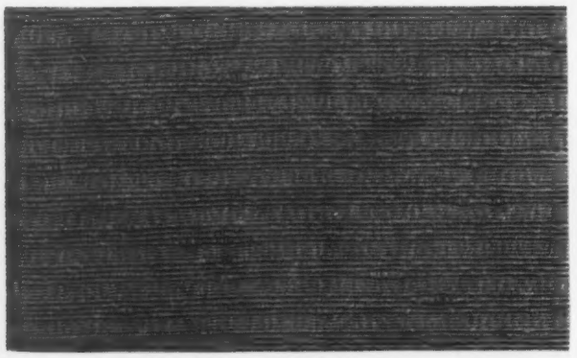
Sample C. Satin with coarser face.



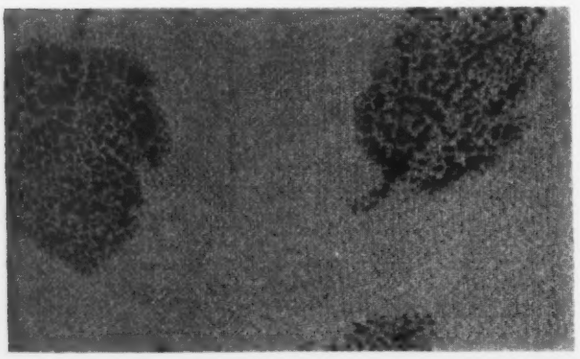
Sample D. Five-shaft satin with crepe filling.

Cross-Dyeing Effects

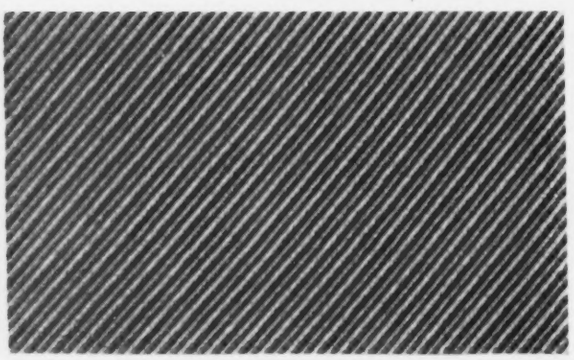
The fact that cellulose-acetate yarn does not respond to the same dyes that are used for the other rayons, gives an opportunity for the production of beautiful effects by the well-known cross-dyeing method. Thus, a worsted fabric in which there were, say, satin stripings of natural silk, of one of the regenerated-cellulose rayons, and of acetate silk, could be so dyed in the piece that the foundation cloth would appear all one color,



Sample E. Cross bars of white and broken blue effect



Sample F. Printed crepe georgette



Sample G. Sixteen harness diagonal effect

with the other three materials in different colors. Natural silk, either reeled or spun, may be twisted with rayon, and a double-and-twist effect produced in dyeing. Again, the warp may be all of one kind, and the filling of another kind—responsive to a different dye; and two-tone, or "shot," effects may thus be secured.

Rayon is produced in which the individual fibers composing the yarn are of such an extreme fineness—finer than the filaments of natural silk—that the appearance of the yarn, or the fabric made from it, is practically the same as that of natural silk. Again, while a large proportion of the fabrics made of natural silk that are on the market are weighted or adulterated, it is rare to find rayon materials that have been so treated.

Attractive Fabrics

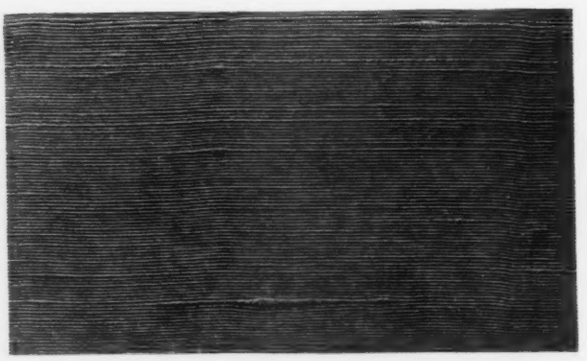
It will be of interest to present here some attractive fabric constructions into which rayon enters.

Sample A is a blue taffeta, made entirely of acetate yarn. The warp is 55 denier, thirteen filament, with five turns per inch, and is reeded 50/5. The filling is 72 picks of 100 denier, with 2½ turns per inch. This has an excellent appearance and body, but a somewhat "rubbery" touch.

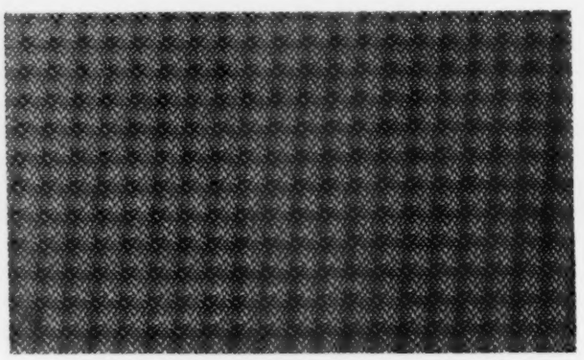
Sample B is a lustrous, beautiful, close-faced, black, eight-shaft satin, also made entirely of acetate yarn. The warp is 55 denier, thirteen filament, and with five turns per inch. It is reeded 45/8. For the filling there are 96 picks of 75 denier, twenty filament, with 2½ turns per inch.

Sample C is an eight-shaft satin, with a coarse, but attractive, face. The warp is reeded 48/3, and the material is 150-denier viscose yarn. For filling there are 80 picks of four-thread 13/15-denier natural Japan silk tram, with 2½ turns per inch. This has been cross-dyed —the warp being old gold; and the filling, black.

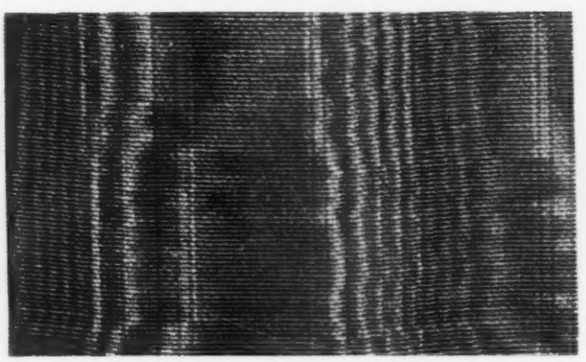
Sample D shows a five-shaft satin, reeded 40/5. The warp is 75-denier acetate yarn, of twenty filaments, with five turns per inch. The filling is 88 picks of 75-denier, 30-filament, viscose crêpe yarn, with 60 turns per inch, right and left.



Sample H. Shantung effect



Sample I. Cross-dyed check effect



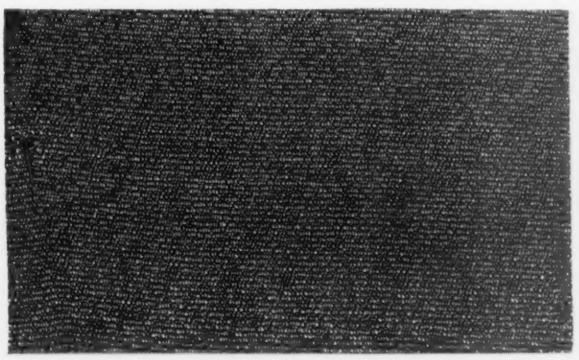
Sample J. Moiré effect

Sample E is an interesting fabric showing alternate cross bars of white and of broken blue effect. The warp is 75-denier acetate yarn, with five turns per inch, reeded 50/3. The filling is 40 picks per inch, with 4 picks in each bar, alternating, of 100-denier, 2½-turn acetate yarn, and a nine-run (14,400 yd. per lb.) silk noil nub yarn. In the dyeing, only the silk noil yarn takes the color, the rest showing white.

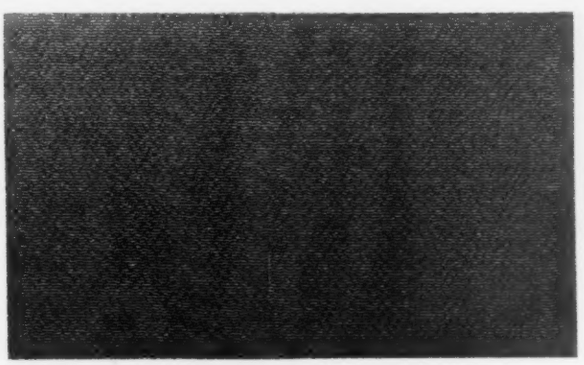
Sample F is a printed crêpe georgette, with a handle wonderfully like an all-silk fabric, in which there are 76 ends per inch, reeded 38/2, of 50 denier, twenty-filament, nitrocellulose yarn. The filling is 76 picks of the same yarn. The twist is 60 to 65 turns per inch, right and left.

Sample G is a sixteen-harness diagonal effect, made entirely of 100-denier, 2½-turn, acetate yarn, the warp being reeded 55/2/2, and the pickage being 88. It has an admirable aspect and a soft flexibility.

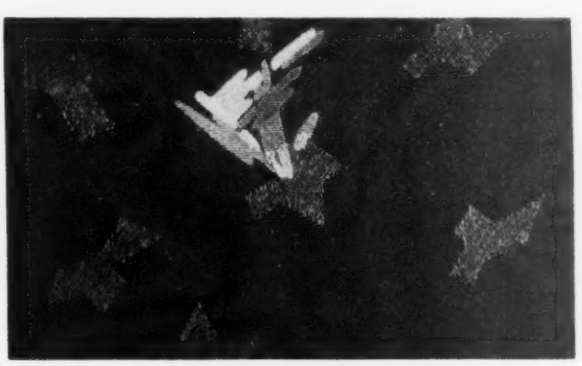
Sample H is a cloth of the Shantung character, with a 75-denier acetate yarn for warp, reeder 50/3. The filling is 50 picks of a 1/20 viscose doupioni yarn (16,800 yd. per lb.).



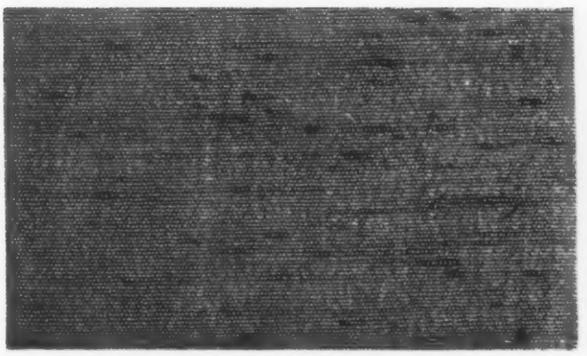
Sample K. Cross-dyed crepe with broken weave effect



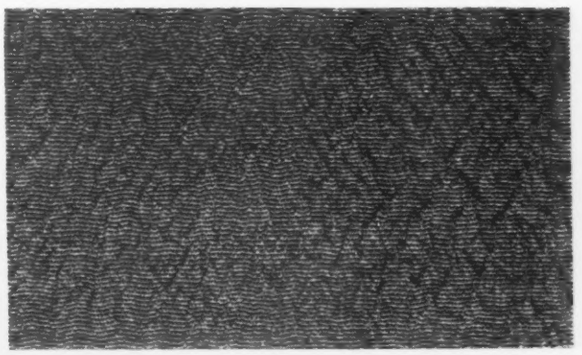
Sample L. All-rayon crepe resembling canton



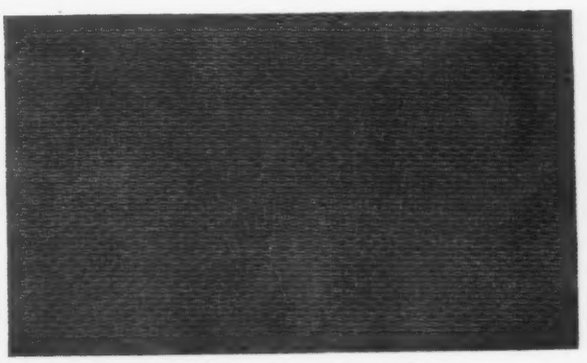
Sample M. Jacquard-figured printed crepe



Sample N. A smart-appearing faille



Sample O. Heavy ondé effect



Sample P. Gros de Londres

The possibilities of cross-dyeing are well illustrated by Sample I, which shows a small checked effect in which the warp is colored cerise and the filling blue. In this, the warp is made of acetate yarn, reeded 38/2, and for filling there are 76 picks of 150-denier, 40-filament, viscose yarn.

Admirable moiré effects can also be secured on fabrics having a suitable cross-rib construction, and in which, as in Sample J, various materials are used. In this there are 180 ends per in., reeded 45/4. For the darker color, there are 4,608 ends of 75-denier, 2½-turn twist, nitrocellulose yarn. For the lighter color there are 2,992 ends of acetate yarn, 75-denier, all five turns of twist per inch. The fabric is cross-dyed to bring out the difference in color. For filling there are 40 picks per inch of 2/16 combed cotton yarn (6,720 yd. per pound), with twelve turns of twist per inch. The filling takes the

(*Continued on page 121*)

Knitting Principles Which Favor Use of Rayon

By M. C. Miller, M. E.
Mechanical Engineer, Manville, R. I.

RAYON has in some branches of the knitting industry been used to a considerable degree with success, whereas in other branches its use has been limited. In order to understand why considerable difficulty is encountered when attempting to knit rayon, it is well that we understand somewhat the nature of the yarn and particularly in what respect it differs from natural silk, for it is in the attempt to knit rayon in place of natural silk that most difficulties are encountered.

The strongest rayon when dry has about one-half the strength of silk, and several types are less than one-third as strong. The strength of any one type is quite variable, however, depending largely upon the fineness of the filaments. If all other features are correct and conditions equal, the finer the filaments, the stronger the yarn.

If the weakness of rayon when dry as compared with natural silk were all that we had to contend with in knitting this yarn, it might well be possible to knit one yarn as readily as the other. Unfortunately in some forms of knitting, particularly when producing full-fashioned hosiery, it is necessary that the yarns be knitted quite wet; and while silk loses about 20% of its strength when wet, rayon loses from 40 to 75%, depending on the type.

These weaknesses as compared with natural silk are continually being improved, and in fact a tremendous improvement is noticeable from year to year. It behooves those interested in the knitting art to follow carefully the improvements made to the various types of rayon yarn.

As to the elongation of rayon as compared with silk, it is reported that silk will elongate about 21%; and rayon, from 12 to 20%, depending on the make, the number of filaments, the degree of uniformity, and the addition of certain chemicals in the process of producing the yarn.

Unaffected by Perspiration and Bacteria

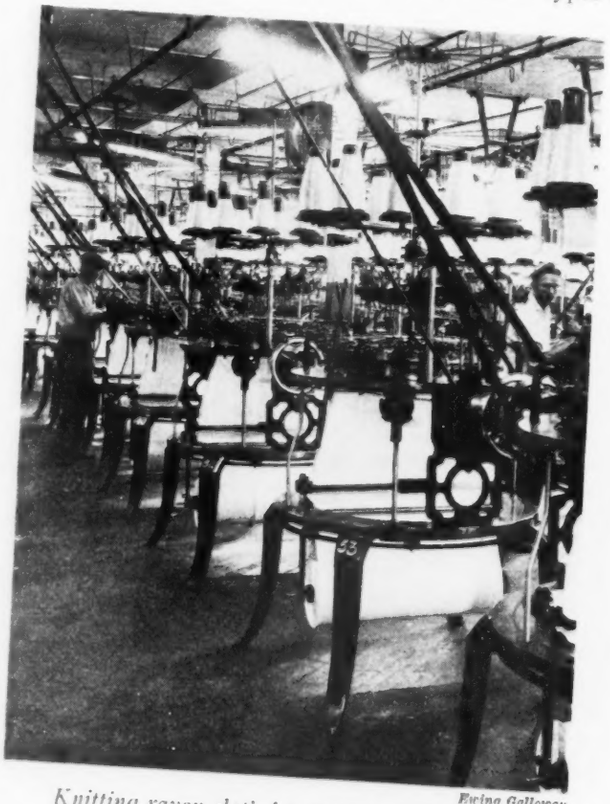
A desirable characteristic of all rayons is the fact that perspiration will not rot the yarn, nor is it affected by bacterial action of any kind. It has the further characteristic—sometimes desirable and sometimes very detrimental—of absorbing water almost as readily as wool, which is of course a better absorbent than silk or cotton. Incidentally this is one of the reasons why all types of rayon exhibit great affinity for basic colors when dyed, although some require a mordant, particularly cuprammonium rayon. All of them, however, will take any form of dye if properly conditioned.

The noticeably higher luster of rayon yarns as compared with silk is due to the fact that rayon fibers are flatter and therefore reflect more light. It is now possible to procure delustered rayon, which is usually the result of adding certain chemicals during the process of producing the yarn. In the case of viscose and cuprammonium yarns, which are produced by wet spinning, some degree of delustering is possible by initially stretching the thread while wet.

In considering the use of rayon for knitting processes in comparison with gum silk, it must be borne in mind that, while gum silk covers about 20% better than rayon, after the gum is boiled off the silk the coverage capabilities of the two yarns are about alike.

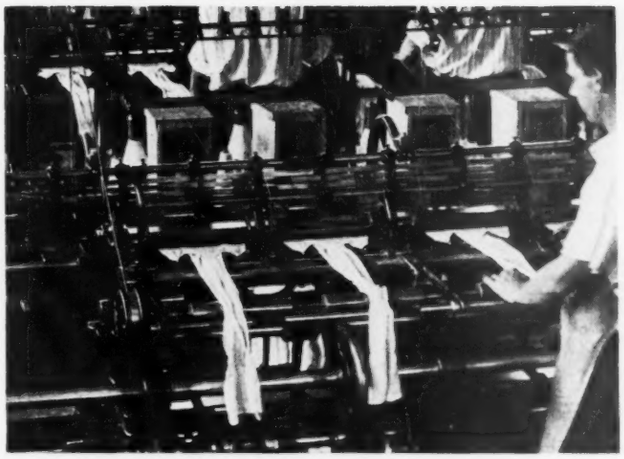
A very valuable characteristic of all rayon is the fact that, when properly manufactured (and particularly if composed of fine filaments), its diameter will run very even and regular—particularly in the case of cellulose-acetate yarn, due to its having been handled less in the manufacture than the other types. Natural silk varies considerably, with the resultant thick and thin places or shadow bands appearing in the knitted fabric.

There is a considerable range of rayon-yarn prices, which depends largely upon the fineness of the filaments and the process. Therefore, when planning to use it, considerable experimenting should first be done to determine the type of yarn the machine is capable of knitting and the necessary degree of filament fineness required. Certain knitting machines will knit only certain types of



Ewing Galloway

Knitting rayon cloth for women's underwear



Rayon is being used in full-fashioned hosiery, although not ideally suited to the purpose

rayon, and it may well be that the type of yarn that the machine is capable of producing into marketable fabric would bring the cost of the goods too high for consideration as compared with other materials.

Five Types of Knitting Machine

Having now stated in general, rayon characteristics as compared with natural silk, we can consider the various types of knitting machines and note their characteristics. We can divide the knitting industry into five branches, each of which uses a definite type of knitting machine. These machine classes are (1) circular, independently-operating-needle machines; (2) circular, fixed-needle machines; (3) flat machines; (4) Lamb machines; and (5) warp machines.

The first type of machine usually produces tubular fabric, including tubular or circular stockings. The second type knits tubular fabric which is used for tubular garments, as well as material for the cutting trade. The third type produces flat full-fashioned hosiery; all machines of this type are full-fashioned, flat, spring-needle. The fourth type produces tubular ties and garments, including hosiery, and in some cases produces flat ribbed fabrics. Such machines are known as Lamb machines, and are usually built by the manufacturer of the product, such as the Burson machine, although some machines of this type are still being built by the Lamb Knitting Machine Co. The fifth or warp type of machine produces ties, scarfs, and other garments, as well as cloth for the cutting-up trade; most of these machines are imported from abroad.

Circular Machines

The circular independent-needle machines were so constructed at the time rayon entered the field that they could immediately use the new yarn to a greater or less degree, and they have in more recent years been developed to a point where large quantities of rayon are successfully knitted on them.

These machines feed their yarn directly to the needles and subject the yarn to very little strain, even though they form their loops at very high speed. All types of rayon can be knitted, and in many cases without even the addition of any oiling or moistening of the yarn. This is largely due to the high speed, which does not permit the yarn to kink of itself between the times it is kinked by the needles, and only one kinking of the yarn is necessary.

Circular, fixed-needle machines draw the fabric upwardly through the form of a take-up, which is not only used to wind the finished cloth on a roll, but also to assist in forming the loops. Hence the pull on the fabric must be considerable. Due to the rayon being much smoother than cotton or wool and not having a gum surface like natural silk, when a hole is formed this pull may cause drop-stitching for some distance.

The method by which the yarn is kinked between the needles in circular, fixed-needle machines requires that the kinked yarn must remain in the hooks of the needles without support for quite a number of needles before the kinks are formed into loops. With yarn having the characteristics of rayon, the kinks will not remain set as they would with cotton, wool, or silk. For the last-mentioned yarns these machines have a wide popularity, and they have been used to a considerable extent for rayon.

Full-Fashioned Hosiery

While full-fashioned hosiery is being produced from rayon, the yarn does not lend itself ideally to this form of knitting, in which sinkers must kink the yarn between needles prior to the needles re-kinking the yarn to form loops. In other words, there is too much yarn-kinking necessary. The needles in this type of machine are rigidly mounted in a straight bar, and knit the cloth by reciprocation of this bar. There are periods in the production of each course of loops when the kinked yarn is required to retain its kinks before it is formed into loops. This is not practical with yarn having the nature of rayon.

The implements that form the knitted loops in this type of machine also act more or less harshly on the yarn. Because many of the elements operate as a unit—that is, *en masse*—considerable strain is placed upon the yarn. Furthermore these machines will not knit either natural silk or rayon without considerable moistening, as their rather light fabric take-up cannot evenly distribute dry yarn. As wet rayon is considerably weaker than wet silk, and in fact considerably weaker than dry cotton of like size, it follows that it is most difficult to produce marketable hosiery on this type of machine from rayon, more particularly if fine-appearing fabrics are desired, necessitating as they do tight, small loops.

It is possible to a degree to knit out-of-gauge full-fashioned rayon hosiery; that is, to use a 45-gauge machine to produce, let us say, 42-gauge fabric. In this case the loops can of course be formed larger; but as the cost of operating a finer-gauged machine is considerably in excess of operating a coarser machine, it is hardly a practical proposition. Further, the difficulties encountered when knitting in finer gauges, coupled with the fact that on these machines it is necessary to transfer loops from edge needles inwardly, bringing about a further strain on the yarn, it is hardly practical to consider these machines in fine gauges as capable of commercially producing rayon hosiery. It should further be remembered that rayon yarn becomes very much more costly as it becomes stronger; and even though the price is less than natural silk, the operator cannot produce the same number of rayon firsts as he can when knitting natural silk, nor can the manufacturer at the present time sell the product in direct competition with the natural silk product.

Lamb and Warp Machines

The use of rayon on Lamb machines is quite practical. These machines are of the latch-needle, independent type,

and form their loops somewhat similarly to circular machines using latch needles. Other than seeing that the yarn is oiled, no particular care need be exercised.

Rayon has been used in considerable quantities on tricot warp machines, as the strain of knitting is quite negligible, although there is some strain between the needles and the yarn source. In these machines the yarn source takes the form of a warp beam or beams, very similar to those in use on weaving looms.

Knitting rayon successfully on this type of machinery necessitates therefore the winding of very perfect warp beams. Great care must be exercised in tensioning the thread when beaming, and in eliminating as much as possible the lapping of one yarn over another. Further precautions to take include beaming at a temperature of 65° or less with a low humidity, running the yarns over some form of oiling device when beaming as well as when knitting, and placing the oiling device when knitting as near as possible to the needles. The latter precaution prevents the feeding of long dried ends to the needles in event the machine is not knitting for periods of time.

I would suggest the feeding of paper between each layer of threads on the beam as an added precaution to insure that the threads average equal lengths. If any of the threads are appreciably shorter than others, a broken end will result, due to the natural weakness of rayon. A break usually occurs at the needles, necessitating a mend.

There is another type of warp machine on which it might be possible to use rayon if all possible precautions are taken. I refer to the machines known as milanese warp machines. These produce their fabric from a series of small warp rolls, usually placed near the floor and carried by an endless chain. Half of the warps travel in one direction, and the other half in the opposite direction. In this manner is really produced an endlessly shogged, double atlas fabric, such as is commonly called "glove fabric."

With this type of machine, extreme care would be necessary so as not to over-tension the yarn. I believe the yarns would have to be sized so as to have a measure of protection against the considerable side rubbing action resulting from shifting the warps continually, first in one direction and then in the other.

Summing up, therefore, I would say that there would be no particular machine difficulty in using rayon for any form of independent needle machine, other than that particular attention must be given to eliminating as much bending of the yarn as possible and, where such bends must occur, using if possible porcelain or a similar highly polished surface. It would further be desirable to reduce drag as much as possible, and yet have enough to eliminate the possibility of faulty kinking or sleazy knitting. If possible, the machine should be operated at low temperatures of say 65° or less, with a low humidity. Vibration should be eliminated as much as possible.

In the winding of the yarn, great care should be taken to see that it is wound with enough tension to prevent its falling from the cone and yet not enough to cause yarn elongation. All surfaces over which the yarn runs while winding should be smooth and preferably composed of porcelain. Knots suitable for knitting should be tied, and considerable attention should be paid to pulling them tighter than would be necessary for cotton, wool, or silk. A rayon knot is very liable to slip, and yet a knot that will not slip is very liable—due to its size—to cause interference to yarn feeding and knitting.

In handling the finished yarn package, it should be stored if storing is necessary—in a cold, relatively dry atmosphere. The packages should be handled very cerefully. Considerable attention must be given to see that the upper end of the cones are absolutely smooth. Some provision must be made for preventing the rayon from falling under the lower edge of the cones while the machine is knitting. This can be done by placing the cones in special holders which are filled with a fluffy material on which the cones are seated.

If the machine is of the reciprocating type, it may be necessary to design a different form of yarn take-up, as rayon is very smooth and is liable to slip under an ordinary clamp, unless the clamping action is quite harsh. A severe clamping is very likely to injure the yarn and possibly cause trouble in dyeing.

Noticeably sleazy rayon fabric made on reciprocatory circular machines, as when knitting split fabric for the high splice and feet of hosiery, is largely due to a faulty yarn take-up. It is of course somewhat due also to inaccurately and ununiformly adjusted needle and web-holder cams. During this type of knitting, there are four of each of these cams in action.

A careful check of the machine should also be made to eliminate all rough places on the needles and web holders, for while such places are detrimental to the production of any type of fabric, they will more usually result in cuts and seconds when rayon is being knitted.

Difficulties are encountered in knitting rayon on straight or flat machines. In this connection, however, I believe that rayon will shortly be developed so that it will compare more favorably with natural silk and will be reduced in price. Finer-filament rayon can then be economically used and will show a marked saving over the use of natural silk.

The use of rayon on warp machines has been practiced to a considerable degree in the past. While it is possible that more or less trouble will be encountered when attempting to use milanese warp machines, I believe the use of rayon on tricot warp machines to be thoroughly practical, provided care is exercised in the preparation of the beams.

In closing, I would add that I believe a suitable moistening agent is advantageous in the knitting of rayon on any type of machine, as it assists materially in protecting the surface of the yarn from abrasion, makes the yarn more docile, and moistens it without weakening it.

I believe the future of rayon, in so far as it is used to produce knitted fabrics is concerned, is assured. I feel that the yarn will be greatly improved and will eventually have all the attributes of natural silk—possibly surpassing the latter in many attributes.

Circular-hosiery mills are large users of rayon

Using RAYON to Greatest Advantage in NARROW FABRICS

By Edwin J. Gibbons

IN NARROW fabrics, as in most other branches of the textile industry, rayon is used primarily for the purpose of embellishment; and in order to utilize this quality to the utmost, certain fundamental rules should be observed. These rules are not based on complicated "isms"; neither are they inviolable. They are simple, easily assimilated facts that may well be considered.

Being used for ornamentation, it follows that the more rayon that can be thrown to the face of the woven fabric, the greater the effect. However, excessively long floats of either warp or filling should be avoided, the length of the float being governed by the use to which the finished material is to be put. Fabrics which are likely to encounter much wear of an abrasive nature should not be constructed with such long floats as those which are to be used for ornamentation alone. Materials that are intended to slide through buckles or clasps—such as garters, suspenders, etc.—are generally confined to short floats, and this is particularly true of most elastic webs. On the other hand, hat ribbons, millinery trimmings, casket trimmings, and kindred articles may be ornamented with figures constructed of comparatively long floats, as most of these materials encounter very little actual wear.

In plain-weave fabrics constructed of rayon in both warp and filling, the best results are obtained by the use of a minimum number of picks, as the sheen decreases conversely with the increase in texture. Square textures of plain weave constructed of 300/1 or 150/2 rayon in both warp and filling may run as dense as 60x60 (i.e., 60 ends of warp per inch and 60 picks of filling per inch) and still remain well within a reasonable weaving range, but in such a texture much of the luminosity of the rayon must necessarily be sacrificed.

The use of a single rayon results in a far richer-appearing fabric than when a two-ply rayon of equivalent size is employed, as the single rayon (unless of too high a twist) presents a comparatively flat, even surface that reflects back the light rays at a single angle; whereas the two-ply rayon, having a comparatively uneven surface, reflects back the light at varying angles. Also, the covering quality of the single rayon is superior to that of the two-ply rayon.

Fig. 1 illustrates a plain-weave fabric which shows up the rayon to good advantage. The warp is 300/1 rayon, the filling is cotton, and there are but 20 picks to the inch.

Fig. 2 illustrates a fabric which, owing to the closeness of the texture, shows up the rayon very poorly. The warp is two-ply rayon; the filling, single rayon; and there are 60 picks per inch.

Among the ground weaves which show up the rayon to the greatest advantage are the satin weaves, the rib weaves, the corkscrew weaves, and the uneven-sided twills.

Fig. 3 shows one repeat each way of the five-harness warp-effect satin weave. With this interlacing 80% of the warp is thrown to the face of the material.

Fig. 4 illustrates a rayon ribbon, the body of which is interlaced according to the five-harness warp-effect satin weave. Warp and filling are both 100/1

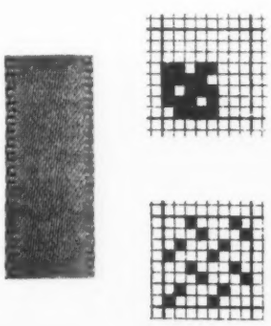


Fig. 3. (Center above) Five-harness warp effect satin weave

Fig. 4. (Left) Rayon ribbon woven according to Fig. 3

Fig. 5. (Center, below) Crow-foot twill

Fig. 6. (Right) Woven according to Fig. 5

Fig. 1. Low pickage emphasizes rayon warp

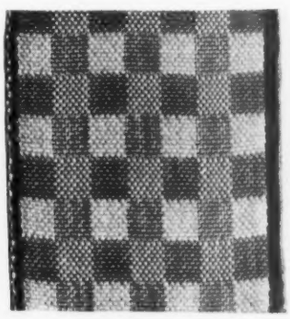


Fig. 2. High pickage reduces luster

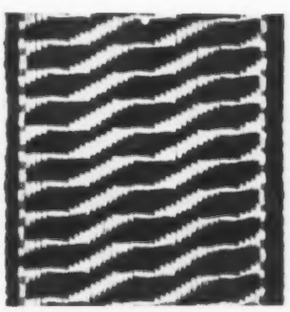


Fig. 7. Curved cork-screw weave

Fig. 8. Entwining twill with broken diagonal rib

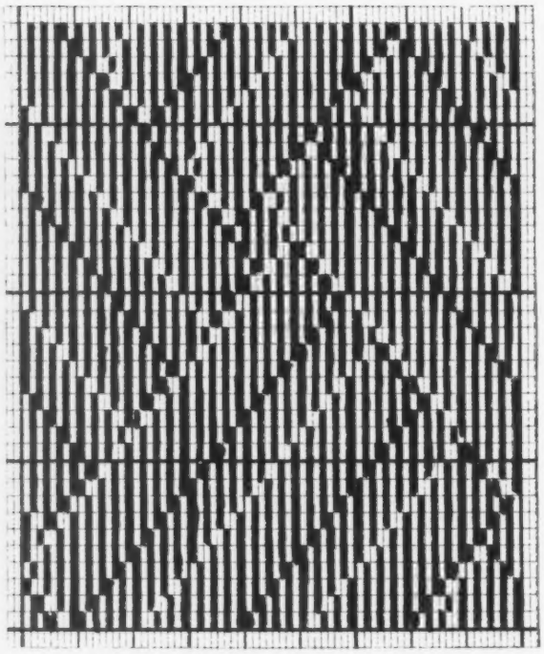


Fig. 9. Portion of design for effects such as in Fig. 8

Fig. 15. Fabric from Fig. 13

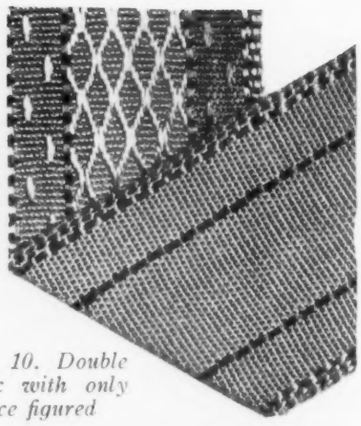


Fig. 10. Double fabric with only face figured

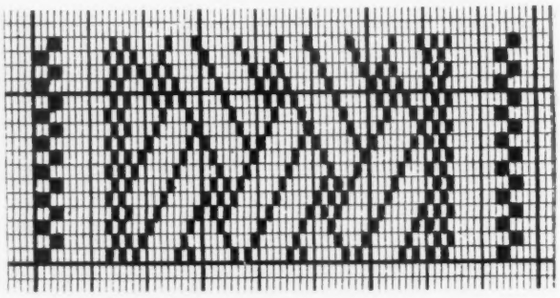


Fig. 13. Design for drop-shuttle trimmings

Fig. 11. Reversible double fabric

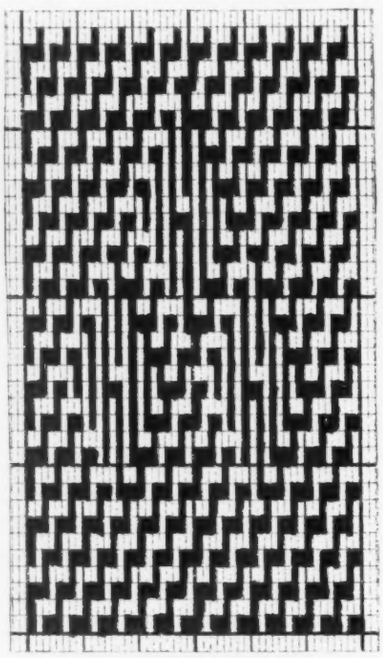


Fig. 12. Portion of design for Fig. 11

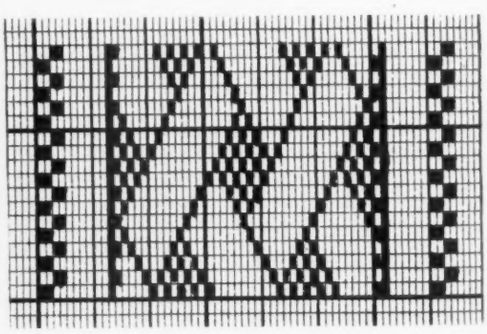


Fig. 14. Another design for drop-shuttle trimmings

rayon, and there are 50 picks to the inch, which with this interlacing is not excessive.

A twill weave popular for throwing a rayon filling to the face of the material is the one-up-three-down broken twill, two ends to the right and two ends to the left. This is known as the "crow-foot" twill or the "four-leaf satin." With this interlacing 75% of the filling is always on the face of the material. This weave is used extensively for lingerie tapes, and so forth.

Fig. 5 shows two repeats each way of the one-up-three-down broken twill, two ends to the right and two ends to the left; and Fig. 6 illustrates a fabric in which this order of interlacing is incorporated.

The four-up-one-down twill gives much the same effect as the five-harness warp-effect satin.

The rib weaves and those akin to them are quite valuable for the purpose at hand, and materials interlaced according to these weaves, because they are usually double face, or reversible, utilize nearly every available particle of rayon in their construction.

Fig. 7 illustrates a fabric interlaced according to a curved corkscrew weave. This interlacing, on account of its reversible feature, presents the rayon to one or the other face of the fabric all of the time.

Fig. 8 illustrates another narrow fabric in which every available particle of rayon is utilized. Here the motif employed for the body of the fabric is an entwining twill, and the interlacing might be termed a "broken diagonal rib." The ends throughout the body of the material are arranged one face, one back; and with the exception of the round edge, each end in every pair of ends interlaces counter to its mate.

Fig. 9 shows a portion of a design such as is used to produce the effect illustrated in Fig. 8.

Double Plain-Weave Principle

Narrow fabrics of rayon in which the construction is based on the double plain-weave principle, and in which

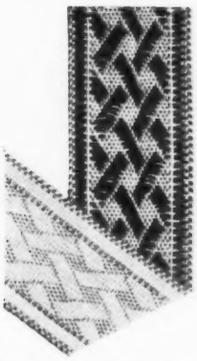


Fig. 16. Fabric from Fig. 14

Fig. 17. Fancy drop-shuttle trimming

Fig. 19. Filling of rayon

Fig. 20. Warp of rayon

ordinarily only the face is figured, may often be improved (and at no extra expense) by figuring the back also. This treatment utilizes most of the rayon; and where face ends and back ends are of different or contrasting colors, it affords the opportunity for a choice between the two effects. The advantage of this treatment will be better understood from a study of Figs. 10, 11, and 12.

Fig. 10 illustrates a fancy belting in which the warp is rayon; and the filling, cotton. The back is plain weave; the face, figured plain weave; and the face and back fabrics are stitched or bound together by four narrow lines of six-up-six-down rib weave.

Contrasting to Fig. 10 is Fig. 11, which illustrates a reversible rayon fabric of the same quality (i.e., the same number of ends and picks and the same yarns) as shown in Fig. 10, with the exception of the six-up-six-down rib weave. In this fabric, however, ornamentation has been effected by raising certain of the back ends to form a figure on the face, while the corresponding face ends are lowered to the back to form a similar figure on that side.

Fig. 12 shows a portion of a design used to produce the fabric illustrated in Fig. 11. Note that throughout the figure the back ends are raised to act as face ends without destroying the plain-weave effect. Note also, on the ends that have been dropped from face to back, the single raisers around the upper portion of each small figure. While these raisers are not required to preserve the face effect, they are necessary to reproduce exactly the figure on the back. This construction differs from that shown in Fig. 9 inasmuch as here the body of the fabric is tubular and the picks are designated as face picks and back picks and interlace independently of each other. In Fig. 9 no such distinction obtains.

In drop-shuttle products, those that show up the rayon to the greatest advantage are constructed with the longest possible filling floats.

In Figs. 13 and 14 are shown two small designs for drop-shuttle trimmings. The ground weave, which is plain in both instances, is not shown. In Figs. 15 and 16 are illustrated the respective fabrics. Fig. 15 represents the better-quality trimming, having ten more ends in the warp and eight more picks per inch than the material shown in Fig. 16; but the comparative shortness of the floats in this design detracts greatly from its attractiveness.

Where the texture is not too close, it is sometimes advisable in drop-shuttle goods, to cause the rayon (extra) filling to interlace with the ground either in plain weave or some looser order of interlacing. With this treatment the rayon will show through somewhat on the face of the goods and lend a certain amount of luster. This arrangement is shown in Figs. 13 and 14. Such a treatment also gives the back of the material a finished appearance.

Fig. 17 illustrates a fancy drop-shuttle trimming in which the extra filling (which is of rayon), where it is not being used as figure, has been caused to interlace in five-harness satin order on the back of the fabric. Fig. 18 shows the manner in which this is accomplished. Here also, the plain (ground) weave has been omitted.

The trimmings shown in Figs. 19 and 20 are good examples of fabrics in which the rayon is used to good advantage. In the former the filling is of rayon, and in the latter the warp is of rayon.

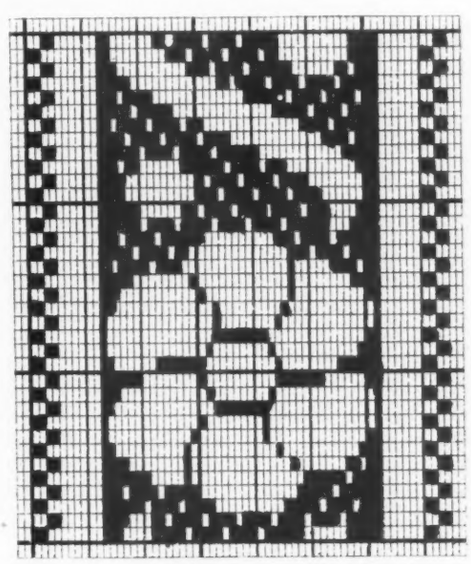
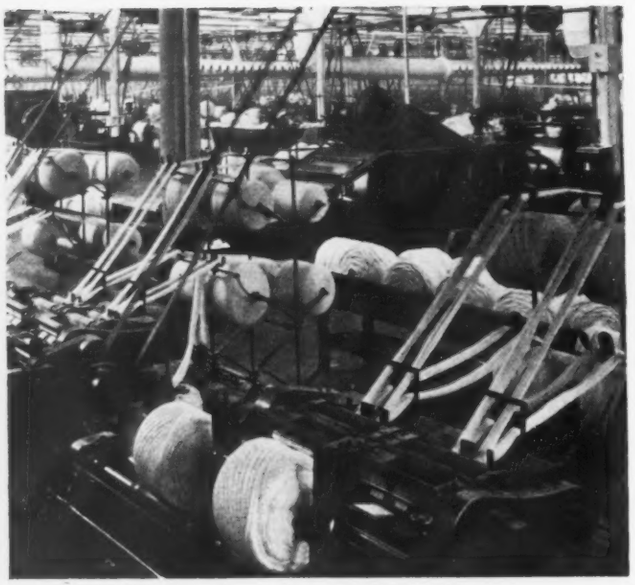


Fig. 18. Design for Fig. 17

Summary

The points brought out may be summed up briefly as follows: Always use as loose an interlacing as possible, compatible with the texture or effect desired. Never float the rayon on the back of the fabric when it may just as well be made to interlace with the face of the goods. Though the appearance of the back of the material is often inconsequential, the value of the product may be enhanced by any slight improvement; and ornamentation, however simple, may often mean the difference between sales and no sales.



Staple Rayon and

The French system is particularly well suited to the handling of rayon-worsted blends

By Henry R. Woodward

STAPLE rayon is a manufactured direct product of the synthetic-fiber industry, and consists of filaments all of which are the same definite length in a given lot. For different uses various types and fiber lengths are available or can be made, but usually the lower limit of length is 1 in.; and the upper limit, 6 or 7 in.

Rayon-waste products are converted by-products of the synthetic-fiber industry and rayon yarn users. The essence of their conversion from the more or less tangled mass of long filaments known as rayon waste consists of the reduction of the filament length according to the use to which the product will be put; the separation or disentanglement of the maze of filaments each from the other; and, in the case of rayon tops, the parallelization of the fibers.

In this article no attempt will be made to describe the great number of varying types of rayon waste, their classification and selection, and the technique of converting them into forms suitable for the worsted and woolen users, except to enumerate the general types offered in the converted condition. These are garnetted waste, carded waste, noils, and staple fiber for the woolen spinner; tops for the worsted spinner on either the French or Bradford system; and spun rayon, rayon blend, or spun-rayon novelty yarns for the weaver.

Rayon Fiber in Woolen Spinning

Characteristics available for woolen spinning include "all viscose process," "all cellulose-acetate process," lustrous, delustered, fine filament, mixed filament, coarse filament, bleached, unbleached, mixed colored, solid colored, staple fiber, cut waste, cut and picked waste, garnetted waste, carded waste, and noils—as well as varying fiber lengths. In addition there are other characteristics due to the sources from which the material is obtained, as rayon in which cotton strings are frequent, the so-called "pink garnetted" type, worsted-rayon noils, etc.

It should be clearly understood that a given lot may have at one time a number of these characteristics, or may have opposing characteristics in a mixture. For example, a rayon garnett may be "not guaranteed all viscose" and may be perhaps 98% viscose process and 2% acetate, bleached, coarse filament, lustrous, and containing a trace of cotton thread. Such a type would be excellent for an all-rayon woolen-spun undyed yarn of not too fine a count, but would obviously cause a great deal of trouble in solid colors or in blends with wool where the rayon and wool were dyed the same shade, and particularly in dark solid colors. In lighter colors the lack of ability of the acetate to take the dye might do little harm, but the cotton threads would not be sufficiently penetrated and would show in the cloth.

Due to the extremely varied requirements for different types of fabrics, and the great number of varying characteristics, space does not permit a detailed matching of types available to specific requirements; but a study of the characteristics above mentioned, and judgment in matching types offered to specific needs, will be of immense benefit to the woolen spinner, not only from a viewpoint of saving faults and trouble with the goods, but as a money saver in blend costs and an enhancement to the selling appeal of the goods.

In general, however, one should guard against acetate fibers in a stock to be dyed with direct colors, as the acetate fibers dye either not at all or take a different shade from the regenerated-cellulose rayons.

It is best to keep the length under about 3 in. in order to prevent differences in tops and bottoms, especially if used with shorter stocks on the ring-doffer system.

If the rayon is used in blends with wool where it is not to assert itself as an effect, it is best to keep the filament denier on the fine side and to use the low-luster type.

When Used as Sprinkling

Where the rayon is to be used as a sprinkling, or silvertone effect, especially in piece dyes, the length and diameter should be as near the average length and diameter of the wool fibers as possible, to prevent tops and bottoms containing varying amounts. Even if tape condensers are used, extra runs and extra layers in the picking and some type of device for preventing fiber separation in the bins should be employed. In addition, the greater carding surface of 60-in.-diameter cards are a help; but where two 60-in. breakers are in tandem, no better mixing on the card will be had than with three separate 48-in. breakers and two intermediate feeds. Another insurance against trouble where waste-end conveyors are not used is to return all waste ends to the picker house to be blended into the next batch of the same mix to be run.

Where a 100% rayon yarn is to be produced, the luster is usually important, and a lustrous coarse-filament stock should be selected. Here the length should be as long as can be taken off the finisher properly and evenly. The

Rayon Waste

in the Woolen and Worsted Industries

THE USE of staple rayon and rayon waste in the woolen and worsted industries has grown at a rapid pace. "There should be no great prejudice against their proper use in blends," says Mr. Woodward, "as they have many excellent qualities which other fibers lack." How these two forms of rayon may be successfully handled on woolen and worsted machinery, he explains in this article.

shorter the fiber length, the less luster in the yarn. Enough oil should be put on the rayon in this case to prevent undue waste and fly in carding, but not enough to cause nibby work or a weakening of the fiber. The weight of the roping off card should be much lighter than for similar woolen counts, even at the sacrifice of some production—say a weight which will give 56 to 58 in. of roping delivery on a 6-ft.-stretch mule. The reason for this is that the less the yarn is drawn while the twist is setting, the smoother the yarn will appear and the more lustrous it will be. A lower spindle speed on the mule also tends to add to the luster, as the fibers are not "thrown out" so much.

In blending wool and rayon in the picker house, the lot should be well layered, with the rayon having thinner layers than the wool. Only the wool should be oiled here. The thicker layers of wool prevent soaking of the rayon, which in carding would be likely to cause very nibby work, in fact almost nubby.

In laying out the blends containing rayon, where it is not used for an effect, the tendency today is to use too large a percentage of rayon, due to its comparatively low price. While no hard-and-fast rule can here be given, it has many times been observed that much over 40 or 50% changes radically the character of the fabric, and much lower percentages are more often used for this reason.

While the fire hazard of running rayon is no more than that of running cotton under similar conditions, where opening is done of the rayon alone in the picker house, the stock should be run into steel, fireproof, sprinklered bins, and the amounts of stock should be kept to a minimum working amount. It is usually slower to dry than wool and requires a proper regulation of the stock dryer and close attention so that in case of fire the delivery may be stopped at once and the fire confined. Where sulfur colors are used on rayon to increase the fastness, the greatest care must be used in drying, and it is better either to put the dried product in a separate storehouse or to have the night watchman visit the dried stock hourly in making his rounds, as often an unnoticed smouldering in a sheet will develop into a serious fire some hours later.

Use in Worsted Manufacture

In the worsted industry rayon tops are as much an article of commerce as worsted tops, although on a very much smaller scale.

Where the spinning mill does not card or comb, the very greatest care must be used to select a rayon top which will match with the worsted top in the blend, will be of as near a uniformly maximum staple and free of short fibers as possible, and which will be clear and free from nibs and cut fiber. It should also be adapted to the product from a viewpoint of shade and luster and should be of similar fiber diameter to the wool in the blend.

Even yet, the above type of mill is at some disadvantage as compared with a complete mill, for this reason: A perfectly clear rayon top is rare indeed, especially a Noble-combed top, but it has been found that by blending the rayon top and worsted in the gill-boxes before combing and then re-combing, a much superior yarn may be produced and one much freer from slubs and nibs. This is of course an added expense but one that is well warranted in many cases, especially if the goods are to be piece-dyed, leaving the rayon white.

In the Bradford system, great care must be used to have a suitable amount of twist in the drawing for rayon worsted blends, as the rayon takes the twist quicker than the wool. If too much twist is put in, "plucking" will ensue, causing uneven yarn and a liability to slubby work.

Another frequent cause of trouble is cut work, causing slubs and unevenness in the yarn. This may be largely avoided by two means. The first is by using a bristle spray brush or similar spraying device instead of the pan, roller, and sluice guides on the first gill box in the drawing. This will prevent full-sized drops of emulsion going on the stock, which in the case of rayon fiber, greatly weakens it and makes "cut work" liable. The second means is to see that the pressure on the rolls, on the gill boxes especially, is the very least at which they will work properly and to see that the aprons are in good condition and free of an occasional pin.

In blending, as in woolen, too high a percentage of rayon rapidly changes the character of the yarn and makes it thin and wiry, without enough "cushiony" feel.

If a mill without combing wishes to recomb its blends of rayon and wool, the best plan is either to buy the blended and recombed top from a rayon top maker, or to send him the worsted top for recombing.

Lower Draft Desirable

As to draft, while a fairly long draft has been used, in general it is better to keep it a little lower in the

drawing than usual. If necessary for production, it may be lengthened some in the spinning, but the more violent action of too long a draft is often conducive to poor results.

The carrier setting of the first roll should be fairly close to the nip of the front roll and the second line set with due judgment according to the ratch to give best results. The ratch should never be shorter than the fiber length on rayon blends, as broken rayon fibers are worse to control and give worse effects than broken wool fibers.

Advantage in Preparation

A mill which has its own carding and combing has distinct advantages in rayon and rayon-worsted blends. First, it has the above-mentioned advantage of re-combing facilities. Second, it has the opportunity of introducing the opened cut or picked rayon waste into its blends with wool as far back as the card, which produces very good blends without re-combing. Third, it can in addition introduce staple fiber in mixtures with wool before carding.

A mill contemplating doing much of this type of work would do well to blend the rayon waste or staple fiber in layers similar to woolen-mill practice. It should break down the layers vertically so that each armful of stock will have some of each kind in proper proportion. The Bramwell feed may be filled this way, which gives sufficiently even results for almost all classes of work. Where unusually even results are required, or where, as is sometimes attempted, a cheap yarn is to be produced by gilling only, without combing, it is best to run through a mixing picker, fearnaught type preferred, or else one of the usual type with the speed cut down to prevent fiber breakage on the longer staple used in worsted manufacture.

Care should be taken that at no time drops or splashes of emulsion be allowed to get on the rayon. Roll pressures must be kept at a minimum, or "cut work" will be the result.

Pinnage Important

Another point to be careful of in the gilling, and especially in the combing, is that the pinnage is not too fine. Rayon fibers, under the influence of moisture, are extremely tender, and too fine a pinnage will not only make poor work, but will give heavy noilage as a result of crowding too much in the pins. Trying to run too heavy a sliver into the comb will give similar results. The pinnage of the circles must of course be adapted in some degree to the fiber diameter of the blend. When running fine-diametered stocks, one should use finer pinnage than would be the case if coarser-diametered fibers were being run. Above all, do not overcrowd the pins.

In general, staple fiber will give better results than rayon waste, for these reasons: first, absolutely uniform staple length with no short fibers; second, freedom from nibs. The reason for many of the nibs in rayon-waste tops is due to its previous condition, and necessary treatment. The waste is in such a tangled condition that in the opening some fibers become knotted, and these knots draw very tight, so as to be hardly discernable without a microscope. They will nevertheless pick up fly and pull other fibers, causing nibs, and these are accentuated into slubs in the yarn.

Another point of importance is that, due to the strain put upon the fibers in the breaking operation of opening, an occasional split fiber will start the nib developing, which often becomes quite sizable in the yarn, and not only sizable but noticeable, because, due to its greater density, the centrifugal force in spinning throws it more often towards the outside of the thread.

It will be found to be an advantage in running rayon-worsted blends to reduce the number of operations as far as is practical for the counts being run.

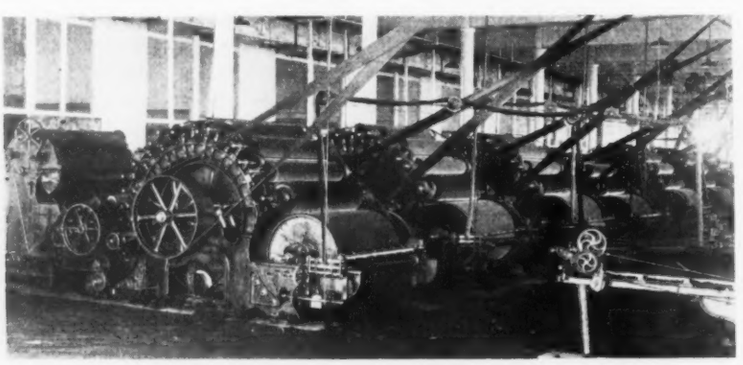
French System Best

In the French system of worsted manufacture, a great many of the sources of trouble in rayon-worsted blends on the Bradford system are reduced or eliminated. With the more perfect combing possible on the French comb, as compared with the Noble, the French system give more perfect results, especially where fine-filament rayon, or staple fiber of say 6-in. staple, is used. Such types are admirably adapted to the operation of the French system.

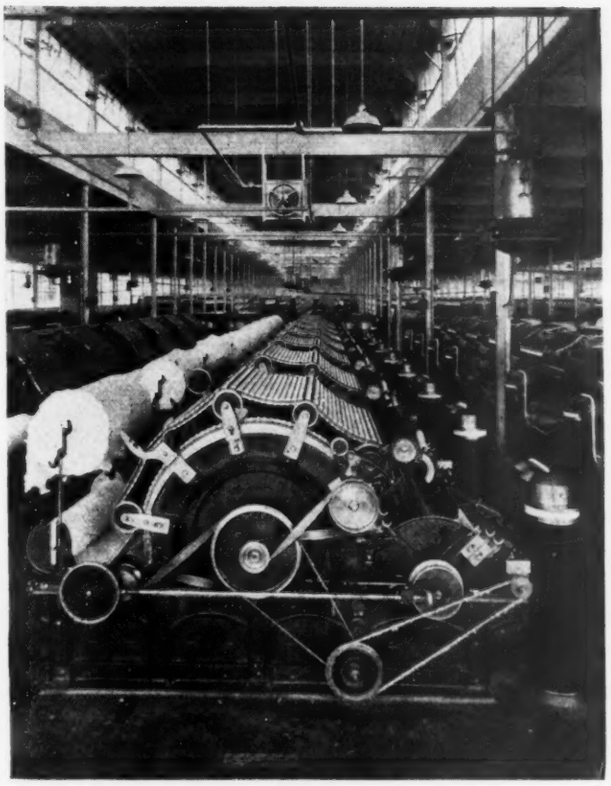
The consumption of rayon waste and staple fiber, especially rayon waste, has kept approximate pace with the tremendous increase in production of filament-rayon yarns. While the percentage of waste in the producers' plants has been steadily lessened, the use of rayon yarns has increased; and waste from winders, converters, and users has steadily mounted in proportionate amount.

Since 1926, with the stopping of the demand for rayon bolivias, rayon waste has maintained a price level which, when compared with other clothing fibers, would seem to demand wide attention, especially from woolen manufacturers.

There should be no great prejudice against its proper use in blends with wool, for it has many excellent qualities which other fibers lack. How far prejudice has been overcome may be gaged by the fact that very fine-denier rayon is largely used in place of single- and double-size organzine silk in the finest of men's-wear worsteds.



Equal lengths and diameter of rayon and wool fibers aid uniformity in carding



In many instances cotton cards are adaptable for handling rayon waste

Rayon Waste in the Cotton Mill

By Charles A. Weston

TODAY the cotton mill can obtain its rayons in skein form, on spools, on bobbins, on tubes, on cones, natural color or dyed. Many mills obtain rayon in skein form and undyed, preferring to spool, wind, twist, and dye it themselves.

Naturally the more processes there are after the yarn is received at the mill, the more waste is made. This increases the cost of the yarn over the original expenditure, although calculations may show that this increase does not raise the total cost as high as of cotton, wool, and other fibers. In many instances this waste rayon is never inspected with the idea of reclaiming the longer lengths, but is sent to the waste department to be bagged and shipped to a waste company, to another mill, or to some concern which realizes its value when reworked or reclaimed.

As a matter of fact, I believe that most mills do not care to reclaim their rayon waste. Possibly they have good reasons for this. Perhaps a mill uses only a small quantity of rayon in its plant, and would have to save the waste for a considerable length of time before there would be enough to use. Again, a mill may not care to reclaim the stock for a special run in the fear that it may become mixed with the regular run, causing seconds or giving the goods a poor appearance. Possibly the mill does not care to purchase equipment for handling waste.

One mill of the writer's acquaintance has an operator who inspects all the rayon waste after it reaches the waste room and pulls out all that appears to be over five or six yards in length, especially badly tangled skeins, filling, etc. She then spends the remainder of her time in tying these lengths together. The cloth made from this reclaimed rayon is sold to the mill operators and a few outsiders at a reasonable price.

Whether the mill is reclaiming its waste for mixing with cotton or is buying staple rayon or waste rayon for this purpose, the procedure is very much the same. There are many different types of machines used, however, and different mills obtain their waste in different conditions, depending on the goods or yarns to be made, the percentage of stock to be used, and the quality and condition of the stock.

It is possible to buy rayon waste from waste dealers after it has been put through several beaters of a waste machine. It is also possible to buy it from mills or waste dealers in the condition in which the mill rejects it; i.e., in its original length or skein, or in short lengths. Some mills with which the writer is acquainted obtain from the rayon manufacturers seconds and imperfect stock, which can be used in mixes after it is cut.

Generally when the rayon waste has been put through several beaters of a waste machine, it is carded on a waste card, put into sliver, and cut; or, if it is broken up well by the beaters, it is merely mixed with cotton, made into laps, and put through the usual cotton processes. Cutting machines may be purchased by the mill, or the cutting may be done by another concern.

Where only small amounts of rayon and cotton are to be mixed, the best method is to lay down a layer of rayon, a layer of cotton, a layer of rayon, etc. Where large quantities are to be mixed, hoppers can be used and the percentage regulated by altering the speed of the apron and rolls in the hoppers.

When cotton processes are used for rayon and cotton mixes, it is essential for the sake of evenness that the rayon stock to be mixed with the cotton be of the same length, or of slightly less length, than the cotton staple. There is one other item that enters into the mixing and which the average man who plans the mixing does not take into consideration; that is, the diameters of the individual fibers. Stock varying in diameter cannot be drafted out so smoothly.

It does not necessarily mean that where a 50-50 mix is made in the picker room, the yarn produced will be a 50-50 yarn. First the card clothing holds the cotton fibers better than the rayon fibers. The latter, because they are heavier and smoother with less attraction for each other, are more easily removed from the wire by centrifugal force, and go to the flats. In some instances the speed of the flats is decreased to counteract this tendency, and in fact sometimes the flats are made stationary. Sometimes they are raised. In other instances agitators are used, similar to fancy rolls.

The licker-in may throw out less cotton than rayon. At times blank screens are used, and in most cases these are best. The mote knives are sometimes changed to give a different angle or pitch.

If the rayon is not mixed evenly throughout the original mix, the rolls, especially on roving and spinning frames, will cause end breakage, thick and thin spots, and extra waste.

Recent Developments in
Processing Viscose-Rayon Fabrics

By A. J. Hall, B.Sc., F.I.C., F.T.I.

COOPERATION between the producer of viscose rayon, the weaver, the dyestuff manufacturer, and the dyer has enabled the production of high-quality rayon fabrics far superior to those on the market a few years ago. Mr. Hall, who is chief chemist of the Silver Springs Bleaching & Dyeing Co., Ltd., and textile consultant to the Atlas Artificial Silk Processes, Ltd., is actively associated with both the manufacture of rayon and the dyeing and finishing of rayon fabrics and has himself contributed greatly to the improved technique of rayon processing in its various phases.

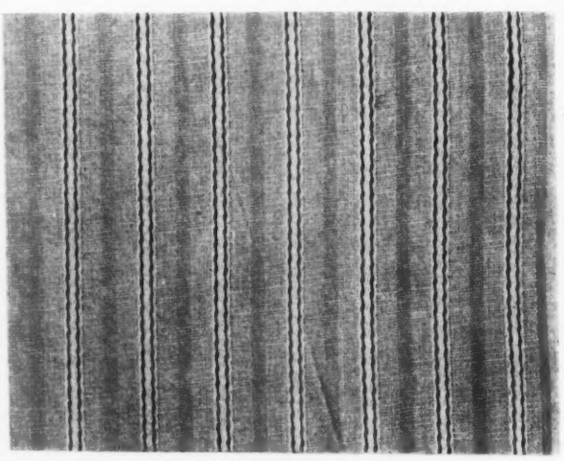
ANYONE who has been connected with the textile industry for a period of at least ten years cannot deny that the fabrics produced today and consisting of cotton and viscose rayon, or rayon entirely, are much superior to those of a few years ago. This progress is the result of effort on the part of the various sections of the trade. The rayon producer, the weaver, the dyestuff manufacturer, the dyer, and the finisher all have contributed their share in this excellent example of cooperation.

Since a major part of defects in rayon goods occurs or becomes evident in the bleaching and finishing, it will be satisfactory to view fabric production from the standpoint of this branch of the industry. A few years ago gray fabrics entering dyeing establishments frequently contained unequal grades of viscose rayon; black oily threads; shiners (viscose threads having a high degree of luster due to excessive stretching in winding or weaving); and in the case of those fabrics also containing cotton, inferior grades of neppy cotton yarns. All of these factors made the task of the dyer a difficult one; and it is, therefore, fortunate that they have been largely eliminated.

Improvements in Weaving

It is true that viscose rayon will withstand kier treatment, such as is normally given to cotton fabrics; but it is often impossible or inadvisable to subject viscose fabrics to this method of purification. Kier treatment involves considerable pulling and pressure on the fabric; therefore it is not particularly suitable for viscose rayon which loses about one-half of its strength and even more of its resistance to shearing forces when wet. The most satisfactory method for purifying viscose-rayon fabrics is that of scouring them with a boiling solution of soap and ammonia while in open width in the jig or while passing through a multiple-box washing machine. In the case of crepes the winch machine is preferred, because it subjects the goods to less stretching. It is evident that the dyer's detergent processes are mild and will fail to produce satisfactory results if the gray fabric is exceptionally dirty. The weaver has thus made an important contribution to the success of colored rayon-fabric production by improving his methods so that he can deliver reasonably clean fabric to the dyer.

Another valuable help obtained from the weaver is that due to his adoption (not too quickly it must be admitted) of mixing filling cops when weaving a fabric containing viscose-rayon filling. Formerly the fabric was woven in a straightforward fashion, one cop of filling being replenished by another in regular succession, each cop or pirn thus contributing a length of about 12 in. to the fabric. Then, if the rayon on one cop differed as regards its affinity for dyes from the succeeding cop, this difference ultimately revealed itself in dyeing from the fact that adjacent lengths (so-called "filling bars") in the fabric were of different depth of shade.



Colored shirting fabric containing viscose stripe mercerized with caustic potash without deleteriously affecting luster and softness of viscose stripe

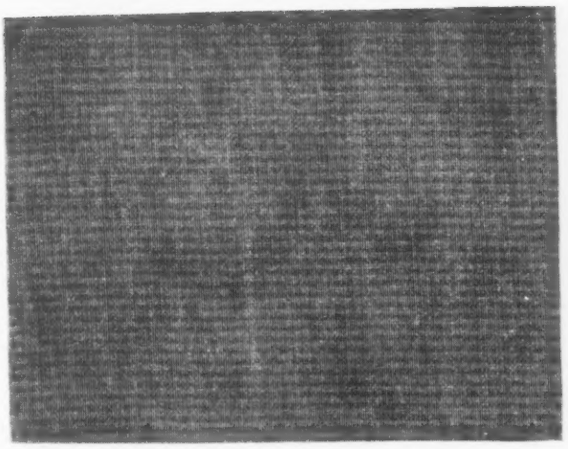
Of course, the weaver in this instance could throw the blame on the rayon manufacturer for producing varying qualities of yarn. But while not neglecting to do this, the weaver has also sought to avoid trouble by a modification of the method of weaving. He now arranges it so that the rayon yarn from two cops alternates with each pair of picks in the fabric. Thus any difference between the yarns in the two cops is largely smoothed out.

The contribution of the rayon manufacturer has consisted of producing a more even rayon and of better grading such unequal yarns as he does produce, so that weavers are supplied with yarn of one quality. Apart from this, the manufacturer has done much to assist the discovery of dyes which least reveal differences in the dyeing affinities of different grades of viscose rayon. The efforts of Courtaulds through the investigations of C. M. Whittaker are a good example of this. Whittaker's researches on the even-dyeing of viscose rayon have assisted dyers to a considerable extent. Further, when it became known that certain dyes dyed unequal grades of viscose rayon evenly, the dyemakers immediately endeavored to extend the range of these useful dyes. Today a moderately large number of even-dyeing dyes are available, and this enables bar defects in viscose rayon fabrics to be avoided.

Test Insures Even Dyeings

A dyer is now able to test a particular dye or method of dyeing as regards its likelihood of revealing unequal grades of rayon by means of Hall's test—a test which was devised by the writer some four years ago and which has proved useful and reliable. The test is simple to carry out. A quantity of yarn is prepared for all future tests by steeping a portion of a hank of viscose knitting twist in 5% caustic soda at room temperature for four hours, then freeing from alkali by washing with cold water, souring with dilute hydrochloric acid, washing until neutral, and drying at a moderate temperature. In the test a length of this treated yarn and a length of the untreated yarn are dyed under the conditions to be used, and the shades on the two yarns are then compared. If both yarns have nearly the same shade, the dye or dyeing method is a suitable one, since it is likely to give even-dyeing; if the shades are markedly different, unsatisfactory dyeings will be obtained. The even-dyeing properties of a dye are inversely proportional to the difference in depth of shade between the treated and untreated yarns. It will be noted that Hall's test is not only suitable for testing the even-dyeing properties of a dye, but is equally serviceable for determining what influence the conditions of dyeing have on the evenness of dyeing. For instance, in dyeing viscose with Chlorazol Sky Blue FF it is easy to see by the test that dyeing in a bath slightly acidified with formic acid gives more even dyeings than with an alkaline dye bath.

Today, barred viscose rayon fabrics should be met with only occasionally. But the dyer is sometimes confronted with fabrics in which everything appears to have been carried out wrongly—the use of very uneven grades of rayon and bad weaving. Here it is better to use padding methods of dyeing rather than jig or winch methods. If the fabric is padded one or more times with a solution of the dye and then dried without previous rinsing, bar effects will be minimized. In the worst cases it is advisable to thicken the dye solution used for padding with a substance such as glucose or dextrin. The fastness of the dyed fabric is somewhat less than it should be, but the case is a choice between two evils.



Bar defects revealed on dyeing a viscose-rayon fabric containing two grades of viscose

Special difficulties have been encountered in the dyeing of cotton goods containing viscose rayon. Perhaps the worst of these is the production of a dyed fabric in which the cotton and the rayon are both of the same depth of shade. Usually the rayon tends to dye to a much deeper shade, so that the cotton "stares" or has a bare appearance. With due care this difficulty has now been largely overcome, at least in English dyehouses. It is helpful to use only those dyes which have a tendency to dye cotton and rayon uniformly as found by testing, and to dye at a moderate temperature. Some investigations made by the writer showed that the shades on the two fibers were more equal when the dye bath was more concentrated and cold, but it is not always possible to adopt such conditions of dyeing. On the whole, the problem is best solved by treatment of the cotton-viscose fabric before dyeing.

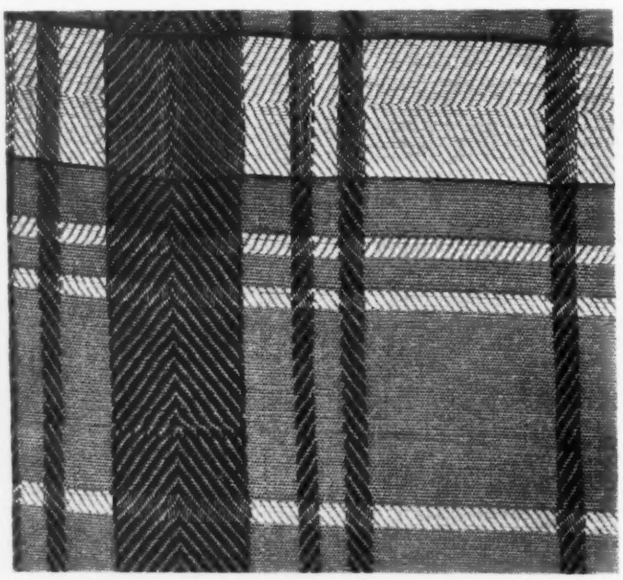
Pre-treating Cotton-Rayon Fabrics

One useful method of pretreatment is that of mercerization. After this process it is found that the increase in affinity for dyes shown by the cotton is greater than that of the viscose rayon, so that on dyeing the mercerized fabric it is much easier to obtain equal depths of shade on both fibers. However, mercerization means extra costs and is not always desired from the finisher's point of view. An alternative method is desirable, therefore, and this is found in the scouring treatment.

Whether or not a rayon cotton fabric is afterwards dyed on a winch machine or jig, makes little difference to the fact that one certain method for obtaining equal depths of shade on both fibers consists of scouring the fabric before dyeing in slack form, such as is possible in a winch machine. This particular form of scouring is essential to successful dyeing. It will be remembered that each cotton thread in the fabric consists of innumerable individual small cotton hairs twisted about each other, and that the absorption of dye by such a thread depends largely on the pressure of these individual fibers on each other at the time of dyeing. If the cotton threads form the warp of the fabric, even in the most modern dyeing machine they will be subjected to a certain amount of stretching. This tension has the effect of causing the individual cotton hairs to press upon each other more tightly. Under these tight conditions it is difficult for the dye particles (these are usually colloidal,

not molecular in size) to penetrate the cotton threads, consequently the cotton dyes to a light shade. By scouring the gray fabric in a winch machine with the minimum of warp tension, the cotton threads shrink in length and swell in diameter, thus reducing the pressure of the cotton hairs on each other. These changes are accommodated by the fabric so that when afterwards dyed (even if dyeing is carried out on a jig) the original pressure of the cotton hairs upon each other is not restored; therefore the cotton dyes to a much deeper shade, which in general is equal in depth to that on the viscose rayon. Apart from all other methods, scouring in a slack condition is the most satisfactory for producing good dyeing results.

Mercerization of cotton fabrics containing viscose rayon is important, and is a process which is likely to be employed extensively in the future. The appearance of a fabric containing more than one fiber is satisfactory in proportion to the balance which exists between the fibers; thus, in a fabric consisting of cotton and viscose rayon it is desirable that the luster of both should be about equal. If mercerized cotton yarn is used in the weaving, this equality of luster is obtained; but if non-mercerized cotton is used, in the finished fabric the cotton gives the fabric a somewhat bare and cheap appearance. Use of mercerized cotton yarn is expensive, and it is much cheaper to mercerize the cotton-rayon mixture in the piece if this can be done satisfactorily. Fortunately it can, although care must be exercised in selection of method.



Check poplin fabric with large viscose-rayon stripes mercerized with caustic potash and afterwards dyed. This shows the equalization of shades on cotton and viscose as produced by mercerization. In reproduction above light reflection from the rayon stripes gives false color value, and stripes are in fact same shade as ground

Mercerizing Cotton-Viscose Mixtures

When viscose rayon is immersed in caustic soda of mercerizing strength and then washed with water, it loses much weight and becomes harsh. For this reason ordinary methods of mercerization cannot be employed for cotton fabrics containing viscose rayon. It has been found, however (E.P. 295,062), that if the mercerizing liquor is removed rapidly from the rayon by treatment with plenty of *boiling* water, the rayon is practically unaffected.

Also the effect is somewhat similar if the alkali is removed by washing with about 12% brine liquor (E.P. 323,307) instead of plain water. These processes depend on the fact now established that the rayon is deleteriously affected only when in contact with caustic soda of around 20 Tw.; the boiling-water and brine washing processes insure that this stage is avoided. An even safer method discovered by the writer (E.P. 295,488) is that in which caustic potash is used instead of caustic soda. Using this method the washing and other treatments usual to mercerizing can be employed, and the rayon remains unaffected. In caustic potash viscose rayon suffers a negligible loss of weight, it shrinks much less than in caustic soda, and its luster remains unaffected. A comparison of the action of these two alkalis has formed the subject of a series of investigations recently published by the writer. (*J. Soc. Dyers and Col.*, 1929, 46, 98, and 171.) It is possible to mercerize all kinds of cotton-viscose fabrics with caustic potash and thus improve their appearance very considerably without the slightest risk of damage.

Finally, it must be noted that the improved rayon fabrics of today are largely possible because of the progress made in finishing treatments. It has become recognized that high-temperature drying and excessive stretching must be rigidly avoided because of their adverse affect on the handle and luster of rayon. The cellulose which constitutes viscose rayon must be regarded as a colloid somewhat after the nature of glue. When glue is dried (baked) it becomes hard; and viscose rayon appears to behave somewhat similarly at high temperatures, and thus lose its soft handle. In finishing, drying should be carried no further than is absolutely necessary and at the lowest possible temperature. Furthermore, after finishing on the tenter frame the fabric should be given ample opportunity to regain moisture. It makes considerable difference in the softness of a rayon fabric whether or not it has been allowed to regain a large proportion of its normal moisture content.

Stretching During Finishing

As regards stretching during finishing, the writer has carefully investigated this point (*J. Soc. Dyers and Col.*, August, 1930), and it appears that stretching decreases the softness and also the resistance of viscose rayon to creasing.

Cooperation between the fabric manufacturer and finisher has developed to the point where it is possible to adapt the construction of a fabric so that the finisher is enabled to use a minimum of stretching in obtaining the finished width.

From the foregoing facts it is seen how vital is the cooperation between all sections involved in the production of rayon, and cotton-rayon fabrics. During the past few years this cooperation has steadily developed, and each branch of the industry has improved its methods until high-quality fabrics now can be produced with less trouble than a few years ago attended the production of low-quality materials which at the time gave the market many difficult problems.

Acetate-Rayon Developments

By Chas. E. Mullin, D.Sc., M.Sc., F.A.I.C., F.T.I.

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EVERY acetate silk on the market today is made from the type of cellulose acetate first developed by Dr. G. W. Miles and his associates about 1905. This type of cellulose acetate was first used successfully for the manufacture of acetate silk by Drs. Henry and Camille Dreyfus and their collaborators; and it is due largely to the unusual ability of these men, both in the rôle of scientists and business managers, and to their untiring research and perseverance, that we have any acetate silk today.

Dr. Mullin, who is Professor of Chemistry, Rayon, and Dyeing, Head of Division of Textile Chemistry, Clemson College Textile School, and author of "Acetate Silk and its Dyes," describes briefly the developments in processing acetate rayons and in producing fabrics of these materials.

The manufacture of Celanese-brand acetate silk has developed entirely since the World War, say since 1917. But the product of 1917 was no more like that of today than a pea is like a pumpkin. It is hard to believe that they are even the same type of yarns. In fact, the major development of the present Celanese yarn may be said to date from about 1921, and it was about this time that it first was made in America.

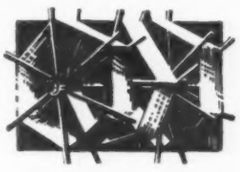
That these developments are real and of tremendous commercial importance is well known to all those engaged in the industry and is proved by the fact that many large rayon manufacturing groups are now producing or contemplating the production of acetate type of yarn.

Developments in Processing

Technical developments in the processing of acetate yarns and fabrics during the past year have not been as spectacular as those during some of the previous five or six years, yet the advance this year has been rapid and steady. It has, however, leaned more towards the perfection of already known and used processes and methods, rather than towards the development of entirely new methods. This is as would be expected after the rapid changes of the past few years.

In the dyeing of acetate materials, the dispersol type of dyestuffs continue to lead the field. Many firms have increased their range of dispersol-type dyes, and whereas these colors were at first only offered as pastes, most of them are now available in powdered form.

At one time considerable amounts of solid-color acetate-rayon fabrics were woven from dyed yarn, but today a good part of these goods are dyed in the piece, just as in the case of all other piece goods. In the same way, while most of the acetate-silk yarns were at one time used for white or colored effects in piece goods, at the present time there is a large production of fabrics made wholly from acetate silk.



Many improvements have been made in both color and discharge printing with the past year. Most of the American and English printers, as well as the more advanced Continental printers, are now prepared to print these materials with either the dispersol type or vat dyestuffs. The dispersol prints are extremely bright and of very good fastness. This type of dyestuffs is especially useful in blotch printing where large areas are to be covered, as the vat dyes often give the goods a specky appearance when used in this way. Another advantage of the dispersols is that they may be used with aniline black, without danger of the halo, which, due to the effect of the alkali in the vat printing paste upon the acid in the aniline paste, usually appears when the black is printed with vat dyes.

The photo-engraved (so-called trichrome-process) prints on various fabrics have produced some really wonderfully beautiful effects which have found a ready acceptance in the market. The delicacy and close reproduction of the natural colors of these prints, especially on panne satin, have developed a demand for this fabric for evening wear.

Particular progress has been made in discharge printing to produce both white and brightly colored designs. Several of the most progressive printers are now handling this work upon a large commercial scale and obtaining very beautiful results upon all background colors.

Fabric Developments

A number of converters are featuring all-acetate taffetas of the Peau de Soie and Gros de Londres types. These taffetas are dyed in the piece. They are excellent reproductions of yarn-dyed all-silk taffetas, and are remarkable for crispness and beauty of touch and appearance.

An outstanding advance in the use of acetate-type fabrics is in men's wear linings. Fabrics made entirely of acetate silk and combinations of this with regenerated-cellulose rayon and cotton, are now widely used for linings. These fabrics are stated to wear particularly well, to be extremely comfortable, practically frictionless, and non-binding. They resist perspiration and do not become frayed or fuzzy.

The unique draping properties of acetate-rayon fabrics, coupled with the fact that they will not rot, mildew, shrink, or stretch, have made them very popular for draperies. Goods dyed with a new line

(Continued on page 177)

Dyeing and Delustering HOSIERY

By Noel D. White

UNTIL quite recently silk hosiery had to be processed with care to protect and enhance the natural luster which is one of the most valuable properties of silk. When rayon was introduced to the textile trade and the possibility of knitting it into hosiery was recognized, it was believed that its high luster would be an asset in further increasing the brilliancy of hosiery. However, it was soon noticed that hosiery made with any of the rayons had an undesirable, unnatural sheen; and manufacturers started to look around for some means of subduing this high luster and making rayon nearer in appearance to real silk. Rayon manufacturers, with their trained staffs of chemists, worked to obtain a fiber which would look like silk, and at the same time other investigators began searching for methods of delustering rayon which had been made by the usual processes. The efforts of both groups have met with success; and there are now available both low-luster rayons that in aspect and handle closely resemble real silk, and delustering compounds for treating fabrics manufactured from high-luster rayon.

The Four Types

Of the four different types of rayon that are used in the textile industry, three—viscose, cuprammonium, and nitrocellulose—are known as regenerated-cellulose rayons. While each of these rayons has certain important characteristics which distinguish it from the others, so far as dyeing properties are concerned, they are all somewhat similar to cotton and other vegetable fibers. Cellulose-acetate rayon—the fourth type—differs from the regenerated-cellulose rayons both in its physical and chemical properties and in its affinity for dyestuffs. Since acetate rayon has little or no affinity for substantive colors, but must be dyed with products developed especially for this purpose, it is particularly suitable for use where vari-colored or cross-dye effects are desired.

Rayon of the regenerated-cellulose type may be knit into hosiery by itself; in combination with acetate rayon, silk, or cotton; or in a three-fiber combination, such as rayon, silk, and cotton. A three-fiber mixture, consisting of cuprammonium rayon, silk, and mercerized cotton, has found considerable favor for the manufacture of hosiery to be dyed in solid shades.

Dyeing Three-Fiber Hosiery

In dyeing hosiery containing these three fibers, it is advisable to boil off and dye in the same bath. The bath is prepared with the proper amount of olive-oil soap, or boil-off oil calculated on the proportion of silk in the goods. It takes 25 lb. of soap, or its equivalent of boil-off oil, to properly degum 100 lb. of natural silk. The dyestuffs for the shade wanted are weighed, dissolved in boiling water, and strained into the bath. Direct dyes are best for this purpose, as they dye the rayon and the mercerized cotton very nearly the same shade. Carefully selected direct dyes will also dye the silk to some extent, and acid colors may be added to bring the silk to pattern.

The bath is brought to the boil, and kept at the boil for 30 min. By this time the silk threads in the hosiery, being loosely distributed, will be thoroughly degummed. From 10 to 30 lb. of glauber salt is added, and dyeing continued in the cooling bath for another 20 min. A sample is taken; and if any addition is needed to bring any of the fibers up to shade, it can be done at this time. Rayon will take up more color at the boil and mercerized cotton in the cooling bath. The silk may be shaded in the cooling bath, in the subsequent washing, or—if preferred—in an acidulated washing or finishing bath. The problem of securing satisfactory results is largely one of proper selection of dyestuffs and correct control of temperature.

In mixtures containing viscose rayon, the processing is carried on in practically the same manner, as this fiber

and cuprammonium rayon have much the same affinity for direct colors. If preferred, however, dyeing may be done by the two-bath method. The goods are boiled-off in soap and rinsed in the same way as for silk and cotton alone. They are then dyed in a glauber-salt bath, with the addition of 2% of acetic acid at the end of the dyeing to cover the silk properly with a minimum amount of dyestuff. In this case the dyer must be careful to have the cotton a trifle darker before adding any acid, since acetic acid will strip some of the color from the cotton and cause it to be absorbed by the silk.

Nitrocellulose rayon is not employed extensively in mixtures where a solid shade is to be dyed, as its affinity for direct dyes is limited and it is more difficult to obtain a good union with that fiber. Cellulose-aetate rayon is used widely in men's half-hose that has to be dyed in vari-colored patterns. At present it is not used in as large amounts for this purpose in women's hosiery because of the fact that this type of hosiery is usually dyed in solid shades. Except for black or colored heels and clocks, fancy patterns in women's hosiery are not yet fashionable.

Bare-Skin Hosiery

A year or so ago a fad started of wearing no stockings at all; this led to the fashion of wearing hosiery with the subdued sheen of the skin. Some one started to wear stockings with the inside out, showing the reverse knitting. It was found that the closer stitches of the reversed knitting gave a much subdued luster, but a large and unsightly seam at the back. Seaming the hosiery inside out did not find much favor, but a demand arose for hosiery with a dull luster to comply with the new fad.

Chemists began to work on delustering formulas of various compositions. Some alarmist began to cry that delustering chemicals would damage the fiber, others said it caused the hosiery to shrink. The hue and cry stopped the movement for a time, but it could not stem the demand for delustered hosiery. Fashion demanded it; the hosiery wearers had created a demand and meant to have what they wanted.

Delustering Silk

The art of delustering silk is by no means a new one. The writer has no idea when it started; but he remembers well that when the dyer in preparing souple tram for weaving found that it had acquired an undue amount of luster, he merely had to treat the silk in a 1% bath of barium sulphate to remove the surplus luster. When fashion created a demand for a dull finish in hosiery, those in-the-know resorted to various barium compounds. Likewise, a number of dealers in finishing materials introduced delustering compounds, each having its own merits and making it possible for the dyer to supply low-luster fabrics.

The selection of a good all-around dull finish for hosiery is a matter for the dyer or finisher himself to decide. There are several compounds that may be used in perfect safety and with good results according to the nature of the material to be delustered.

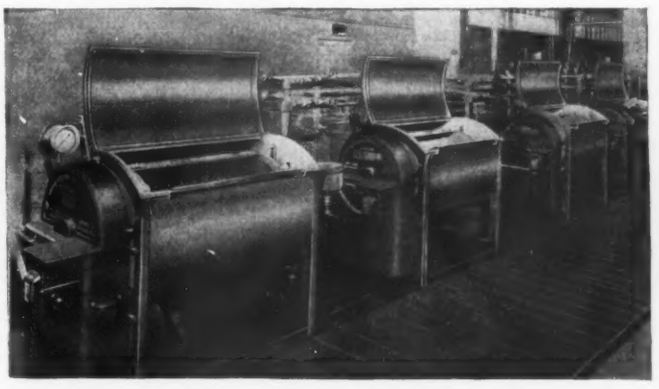
To deluster silk hosiery 1% of barium sulphate is reduced to a paste with turkey red oil, the paste dissolved with boiling water, strained into the finishing bath, the goods run for no less than 20 min. and extracted without rinsing. Owing to the fact that barium sulphate is extremely difficult to keep in solution, it may be found advisable to select instead one of the ready-prepared dull finishes that may be depended to do no injury to the fabric.

Delustering Rayon

The easiest of the rayons to deluster is the acetate cellulose. All that is necessary is to raise the temperature of the soap bath, in which it is dyed, above 180° F. Care must be taken that the operation is not carried too far and that the bath contains no free alkali; otherwise saponification of the acetate cellulose takes place leaving the fiber in a dull and weakened condition.

All the rayons can be delustered quite effectively by working for 30 min. at about 120° F. in a bath of sulphate of alumina standing at 5 deg. tw. or higher. The goods delustered can then be softened in a warm bath containing 2% or more of a good softener. In delustering hosiery, whether it is made of silk alone or of a mixture of silk and rayon, it is easy to carry the operation too far. Some of the compounds on the market contain energetic substances that, while they may not be injurious to the fabric, will make the fiber pucker up and will shrink the goods to an unreasonable degree. Usually a delustering compound that may be used cold is preferable. One compound recently developed may be used in delustering silk, all types of rayon, and mercerized cotton. The dyed goods are worked in a 5% short bath of this solution at about 65° F. for 30 min. and extracted without rinsing. This delustering bath can be kept for economy; the goods can be run into it in successive batches; and the standing bath needs to be changed only once a week.

In selecting a delustering preparation for colored goods, the dyer should test it in a beaker to ascertain what it will do to the shade. A dull finish does not mean a lighter finish, and some of the dull finishes the writer has tested recently not only dulled the luster, but reduced the color to an alarming degree.



Hosiery is often dyed and delustered in this type of equipment

Modern Trends in

Bleaching and Dyeing Rayon-Wool Fabrics

By H. L. Ariente

SINCE the advent of rayon, all classes of people have been able to satisfy their tastes for bright-colored and lustrous garments, which, previous to this time, due to the high price of silk, were only realized by the wealthy. As a result of the demand for bright and lustrous garments, wool and worsteds have suffered greatly, and it was necessary for the woolen manufacturers to create a further interest in their commodity. This they have done to a certain extent by the placing on the market garments and fabrics constructed of a mixture of rayon and wool. A garment thus constructed not only brightens the wool fiber, but makes it possible to create designs with any number of color patterns.

Rayon and wool, one being a vegetable and the other an animal fiber, possess different characteristics and must be processed differently than all-wool or all-rayon materials. Rayon, however, does have practically the same affinity as cotton for the substantive or direct colors, and a mixture of rayon and wool may be processed somewhat similarly to cotton-wool mixtures. By selecting the proper dyestuffs and the correct procedure, perfect unions may be obtained, or the wool may be colored and the rayon left white. It is also possible to dye the rayon and leave the wool white, or to dye each fiber a different shade. This offers many possibilities for skillful color blending.

Preparation for Dyeing

Before a fabric of this type can be dyed, it must be prepared in a thorough manner or many defects may arise, such as shaded coloring, streaky dyeings, or oil smears. Wool and rayon fibers are both conditioned with various oils to enhance their spinning, winding, knitting, or weaving qualities. Wool seems to give up this oil quite readily in the scour, except under certain conditions that are not normal. Rayon, on the other hand, may give considerable trouble when this conditioning oil is scoured out, since it combines with the soap or soluble oil to form an insoluble curd or precipitate, which adheres to the fiber. In this case, when rayon is being conditioned, a good olive oil should be employed.

In scouring fabrics composed of rayon and wool a neutral low-titre soap or some of the specialties developed for this class of work should be used. When purchasing specialties, however, care must be exercised, as there are many on the market that are not entirely satisfactory and may cause additional difficulties. Scouring should be carried out at a temperature of 120° to 125° F., for one hour, using approximately 5% of soap and 2% of a mild alkali (preferably trisodium phosphate). It is essential that the rinsing be carried out with warm water; and wherever possible the rinse waters should be flooded over the machine before draining so as to flood out any curd that may have formed. Hard water should be softened for use with rayon.

Some manufacturers of specialty soaps and soluble oils advocate the dyeing and scouring of rayon mixed fabrics in one bath. This procedure may work out well in some cases, but in the long run it will be found more economical to scour and rinse out thoroughly before dyeing or bleaching. For a market bleach, it is possible to obtain satisfactory results in a single scouring and bleaching operation; this only, however, by the proper selection of scouring agents. When this method of bleaching is contemplated, it would be well to obtain the advice of experts as to just what procedure to follow.

Dyeing Methods

After the material has been thoroughly scoured and rinsed it is ready for the dyeing or bleaching operation. Any of the reputable dyestuff manufacturers can supply dyes for dyeing unions. It must be remembered that wool will absorb the dyestuff heavier at the boil and rayon at approximately 160° F. By the careful addition of neutral sulphonated castor oil, the dye absorption of the two fibers may be controlled, since this product will retard the absorption of the dye by the wool. When it is desired to keep the wool white, a small quantity of trisodium phosfate and neutral soap, together with the proper selection of dyestuffs, will effect this result. When the wool is to be dyed and the rayon left white, the use of the acid colors and the addition of a small quantity of acetic acid will give satisfactory results.

In this class of work it is also quite important that the dye manufacturer be consulted to recommend dyes that will not tint the rayon. The dyestuff manufacturers maintain technical laboratories for this work and can advise just what dyes are required for the various color designs desired. It must be kept in mind that in dyeing rayon-wool mixtures it is essential that the fabric be brought to shade in the least possible time, since continued working in the dye machine will felt the wool and weaken the tensile strength of the rayon.

Rayon-and-wool materials may be bleached in several ways and by the use of various bleaching agents, of which a few will be mentioned. Perborate of soda contains only a small quantity of available bleaching oxygen and the amount necessary to obtain a bleach makes it quite expensive. The permanganate process is rather economical, but is difficult to control except in skilled

hands; and unless controlled properly, it will cause harsh and tender results.

Bleaching with Peroxide

By far the best bleaching agent for wool-and-rayon mixed materials is hydrogen peroxide. This product may be obtained in solutions up to 100-volume strength, or may be made at the bleachery from sodium peroxide. The latter method is a trifle cheaper, but is not nearly as foolproof as the hydrogen-peroxide method. Bleaching with peroxide may be carried out in rotary machines where the material is in motion, or in stationary vats. In the latter case, care must be exercised that the goods are not too tightly packed, otherwise shaded results will be obtained. The bleach bath is prepared by adding ½ to ¾ gal. of concentrated hydrogen peroxide to every 100 gal. of water. The water should first be treated with 3 to 4 lb. of silicate of soda at 42° Bé., and the whole thoroughly stirred. After the hydrogen peroxide has been added the bath should show an alkaline test. In case it does not show an alkaline test add about 1 lb. of trisodium phosfate. Should the water in use be hard or show a pH value below 7.2, add 1 lb. trisodium phosfate to every 100 gal. previous to the addition of either the silicate of soda or the hydrogen peroxide to the bleach bath.

If the goods are to be bleached in a vat, the bleach liquor is now heated to 130°F. and the goods entered. The temperature is then maintained at 120°F. for three hours, at which time the material should be a satisfactory white. When bleaching in a rotary machine, load the material and allow to rotate for several minutes cold, then raise the temperature to 120°F., and maintain for three hours. At this time, if the bleach is not satisfactory, allow the operation to proceed for another hour and sample. When a satisfactory bleach has been obtained, the goods are thoroughly rinsed with warm water until the water and material are clean of all chemicals. A soaping subsequent to bleaching is conducive to a softer and clearer white.

The writer recently obtained a satisfactory bleach on rayon-and-wool material in which the rayon had been dyed with sulfur colors (in the yarn) and the wool left

Bleach house with asphalt floor to provide good drainage

natural. There was only a slight change in the cast of the rayon shades, which were brightened considerably. The goods were first thoroughly scoured with a special detergent to remove any dyestuff not thoroughly fixed in the fiber and the bleaching with peroxide carried out with the addition of just enough silicate of soda to give the bath a pH value of 7.8 to 8.

If the characteristics of the two fibers are always kept in mind and the cooperation of the dyestuff manufacturers and the bleaching experts sought, the dyer or bleacher should have little difficulty in handling any problems that may arise in the processing of rayon-wool mixed fabrics.

Progress in the Rayon Fabric Field *(Continued from page 103)*

same color as that taken by the nitrocellulose yarn.

Sample K shows a cross-dyed crêpe in a broken-weave effect. The warp is viscose yarn, about 150-denier; and the filling is three-thread natural silk crêpe twist, all right-hand twist. There are 120 ends and 60 picks per inch. The warp is dyed gold; and the filling, black.

Sample L is an all-rayon crêpe of the Canton order, made of non-lustrous viscose yarn, with 150 warp ends of about 100 denier, and 60 picks of a moderately coarse, hard-twist, viscose crêpe filling, two picks right and two picks left alternately.

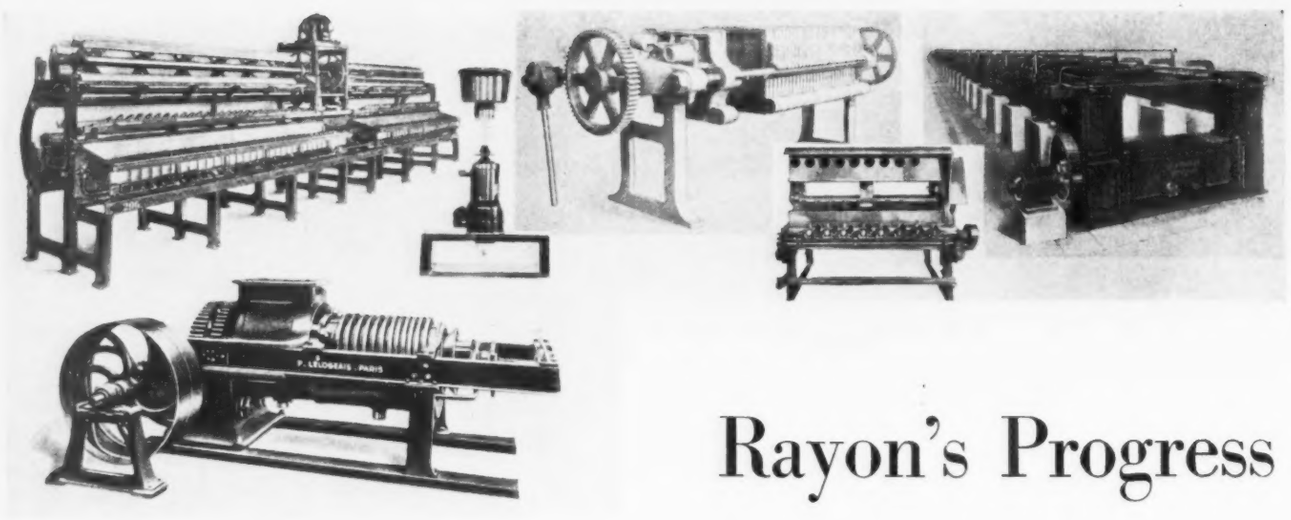
Sample M is an all-viscose jacquard-figured printed crêpe. The warp is about 80 denier, with 150 ends per inch. The filling is a fairly fine crêpe twist, right and left, with 64 picks per inch. The figures are brought out in satin, which show up sharply against the dead black foundation.

Sample N is a smart-looking faille fabric. The warp is acetate yarn; and the filling, single worsted yarn into which very fine black nubs have been introduced. The construction is about 80 ends and 42 picks per inch.)

Sample O presents a heavy ondé effect. The construction is 100 ends of acetate warp yarn per inch, the threads being well twisted. For filling there are 40 picks of a three-thread acetate yarn, the group being slackly twisted to the right. In with this group there is a thread of crêpe-twist silk, apparently about four-thread, with a fairly heavy right-hand twist. All the pickage in this cloth is of the same twist.

Sample P is a very attractive Gros de Londres, the warp being 200 ends per inch, arranged single and double in the conventional way, with 64 picks of filling. This construction is of acetate yarn throughout.

The foregoing will illustrate some of the potential uses of rayon. There are many other constructions of crêpe-de-chines, flat crêpes, crinkled crêpes, failles, louisines, etc., all of which, in their way, are equally good. These embrace every kind of combination of reeled silk, spun silk, cotton, and worsted with all of the different varieties of rayon.



Rayon's Progress

By Winn W. Chase,
Assistant Editor, TEXTILE WORLD

MARKED progress in textile-machinery design has been one of the outstanding developments of the last year. And nowhere have improvements been more noteworthy than in equipment for the manufacturer of rayon fibers and fabrics. This has been attested not only at the textile exposition in Boston and the knitting-arts exhibition in Philadelphia, but also at expositions held recently in England and Germany.

A review of these developments discloses many radical changes in design of equipment and a still larger number of innovations and improvements in existing machines. Further analysis indicates that greater progress in equipment for the manufacture of synthetic fibers has been made in Europe than in this country. The opposite, however, seems to be true as regards development of machinery for the manufacture and processing of rayon yarns and fabrics.

Rayon Fiber Production

Perhaps the most revolutionary development in equipment for the manufacture of viscose rayon is apparatus designed for the continuous preparation of alkali-cellulose. Several installations have been made already in France and Germany; and at least one plant has been equipped for continuous steeping, pressing, and disintegrating. The equipment used in this process consists of baskets of perforated sheet iron for holding the cellulose sheets, steeping vats containing caustic-soda solution constantly maintained at the proper strength, a mono-rail trolley which conveys the baskets to a press, a special type of press, and a continuous disintegrator.

One type of press in successful operation consists of two screw conveyors of opposite pitch placed end to end and rotated in opposite directions in a perforated cylinder, the outlet of which is partially closed by means of an adjustable-position cone. The alkali-cellulose is fed by the conveyors to the perforated cylinders where it is pressed; the expressed liquor escapes through the perforations and the alkali-cellulose leaves at the outlet, the orifice of which is regulated by the position of the cone.

Three crushers, usually supported on the same shaft and direct-motor driven, make up the disintegrator. Alkali-cellulose—coming from the press in the form of small compact masses—is fed to the first crusher or roughing roll, blown into the intermediate crusher, next to the finishing crusher, and then to the ripening tanks. Advantages claimed for the process include low cost of equipment, savings in labor and floor space, and increased production.

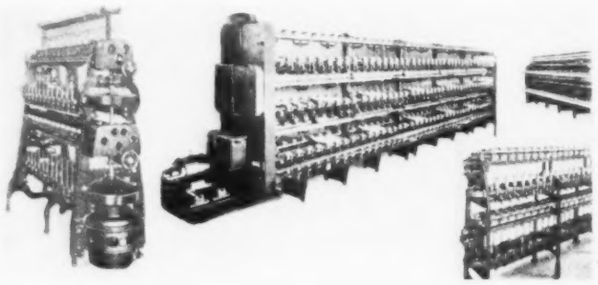
Machines for shredding alkali-cellulose preparatory to xanthating, which formerly were designed for manual operation of the discharging mechanism, are now available with mechanical, hydraulic, and electrical discharge. Other improvements in these latest-type shredders include a large jacketed area, permitting cooling without the use of brine; roller bearings on drive shaft and blade axles; and automatic control for motor-driven shredders which automatically reverses the direction of the blades.

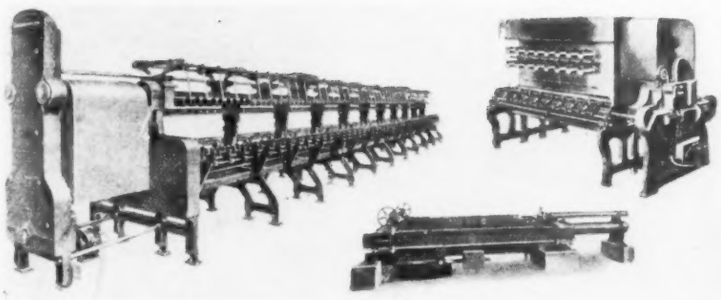
An interesting development is the use of chrome iron in mixers and shredders employed in the acetate process.

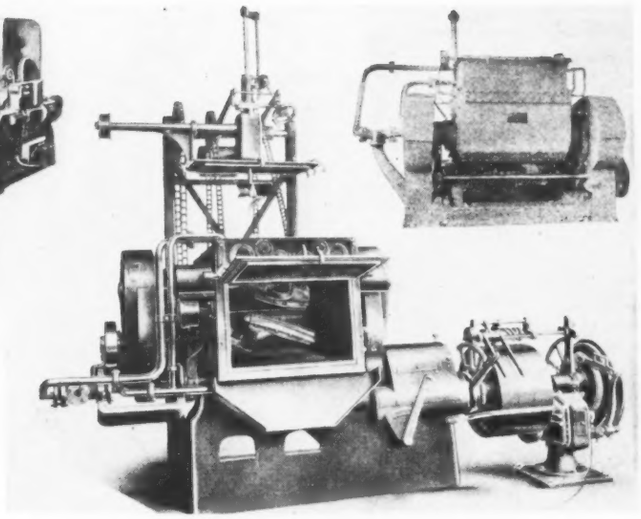
Improvements have been developed in the Vissolver, a device used in place of the mixer ordinarily used for dissolving cellulose xanthate in dilute caustic to make viscose solution. This machine, which gives a progressive increase in the surface of the xanthate, is said to produce viscose solution suitable for easy filtering in from one-half to one-third the time previously required.

Improved Equipment for Viscose

Of the improvements in filter-press construction, most interesting perhaps is a combination immersion trough and mercerizing press, developed in Europe, which eliminates hand closing of the ram, interruption of the feeding rail by the ram, and manual return of plates to their initial position. This press is also provided with an ejection trap in the floor of the immersion trough. In operating this machine, the trough containing the alkali-cellulose is introduced into the press cylinder and pressure exerted until the mass has been brought in contact







Vividly Shown

by New Equipment

with the top plate, when the trap cover is opened by a lever. The return piston now is set in operation, thus drawing back the plates to their original position and allowing the pressed alkali-cellulose to fall through the trap into the disintegrator; the cover is then closed and the press recharged. Use of this equipment is said to result in reduced labor cost, elimination of alkali losses, and production of viscose of uniform viscosity.

Another machine of European origin is a viscose disintegrator allowing complete emptying of the disintegrated alkali-cellulose without manual assistance. This device is of special value in rayon plants where the disintegrating room occupies the floor above the ageing room. To allow tilting of the trough to any angle up to 45°, the disintegrator is fitted with a toothed segment and rocking lever in place of the counterpoise ordinarily employed on this type of equipment. Like the shredder previously described, this machine also may be equipped with an automatic reversing device. Xanthating and dissolving in one operation is made possible with a vacuum kneader shown at a recent textile exposition in Germany. It is stated that this machine not only produces dissolved viscose, free from lumps, in less than five hours, but also, by eliminating the need for sulfiding drums and dissolvers, reduces production costs.

Spinning Machines

Spinning-pump design has shown marked progress during the last year, and both piston and gear pumps are now available which obviate difficulties due to the fluctuating pressure and stoppage of the spinning nozzle. Spinnerettes, likewise, have been refined; greater precision in the shape of the holes has been attained, and a number of new alloys giving longer life have been developed; gold-palladium, for example, has been offered to replace gold-platinum and platino-iridium for viscose manufacture, and nickel and Monel metal for acetate and cuprammonium production.

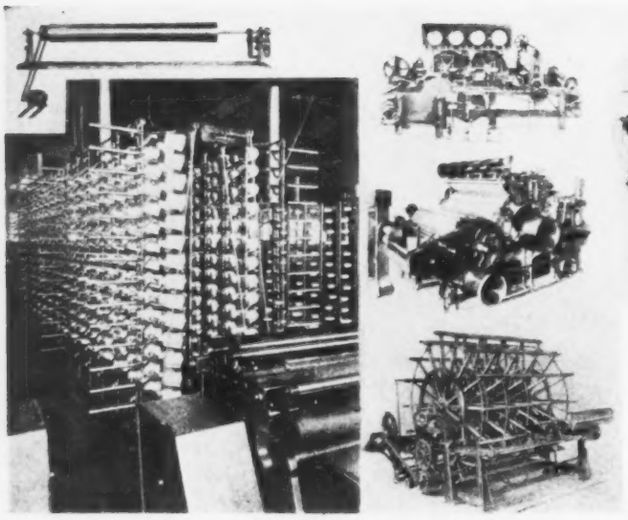
• Both in this country and abroad manufacturers of spinning machines have made noteworthy advances. There is on the market now a bobbin-type machine having a double row of spindles, one row of which is active and the other inactive, which permits continuous spinning. This equipment is fitted with a separate clutch for each spool, and with a unique thread-guide arrangement, which maintains the same air length between the bath and either the upper or lower spools. A pot-type machine is also available which spins and twists the threads at the same time, thus eliminating separate handling and wastage. This machine is equipped with an individual motor for each spindle, which obviates interruption of other pots should one be stopped, and is fitted also with a single-end power drive which operates all other movements at a predetermined, unvarying ratio of speed. These machines are both designed to allow changes to be made so quickly as to prevent regulators, filters, and acid baths from becoming clogged from inaction. In England a centrifugal spinning machine equipped with a new electric spindle has been brought out, while in Germany a machine providing for automatic changing of the bobbin-spindle shafts has been announced. The latter machine is said to insure uniform filament thickness without variations in titre.

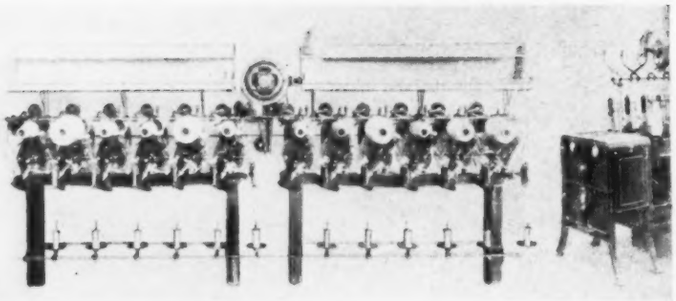
Special Apparatus for Staple Fiber

Increased use of staple fiber has called for the development of a spinning machine which will produce coarse counts of rayon. One type of equipment for this purpose, which permits the spinning solution to be precipitated and the resulting filaments made into hanks on reels in the usual manner, is fitted with double reels, so that as soon as one reel is full the threads can be changed over to the other without interruption of the process.

A number of innovations for giving increased production and reduced maintenance and operating costs have been made in rayon-spindle design. One of these is a high-speed rayon spindle utilizing a Micarta bucket to allow greater capacity and speed.

Another new machine is a combined desulfurizing





and bleaching machine suitable for treating both bobbin- and pot-spun yarn. In the pot method the rayon is taken from the reeling machines directly to the prewashing section of the washing, desulfurizing, and bleaching machine. By this method no stretching or drying is done before desulfurizing. The yarn then automatically goes through the different processes without further handling by operatives.

It is stated that since progress of the rayon through the machine is handled by efficient mechanical motions, which eliminate the tangling and straining of the rayon, the product is much more uniform and more evenly processed than by hand or semi-hand methods. It is also asserted that the use of this machine for finishing rayon yarns reduces labor costs to a minimum, and that the power cost is low.

Details of the equipment used in the Brandwood process for rayon, so far as they have been made public, include special spools on which the rayon is wound and subjected to washing, desulfurizing, bleaching, dyeing, and sizing. This equipment is said to reduce to a great extent the variety of machines that are needed in other processes.

Twisters

Vogue for crepe, grenadine, and other novelty yarns of high-twist and low luster has caused machinery builders to devote special attention to equipment for producing this type of yarn. This has resulted in the introduction of a number of twisters of new or improved design. Several concerns have concentrated on double-deck twisters. One of these machines which is suitable for producing tram, organzine, crepe, and grenadine will give twists with from 1 to 80 turns per inch, each deck operating independently of the other. One deck is offset more than the other, thus giving more working space and affording greater visibility than when both decks are in line. Another machine has both decks driven by one motor, but an ingeniously designed drive shaft allows each deck to be operated separately from the other should need arise.

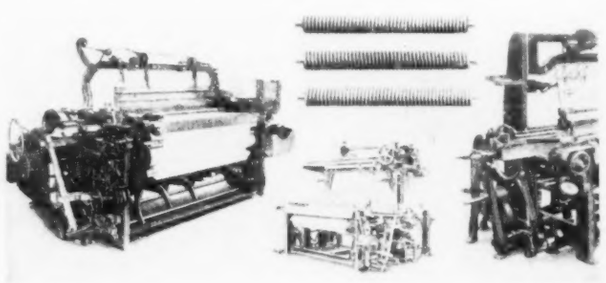
A third machine of this type includes among its improvements individual spindle adjustments for assuring uniform spindle speeds, individual thread guides adjustable in every direction, and simplified gear arrangement to facilitate change of twist. There has also been introduced recently an up-stroke twister of sturdy construction, built to take standard sizes of bobbins, and having a wide range of twist adjustment. In Germany a three-deck twister has made its appearance.

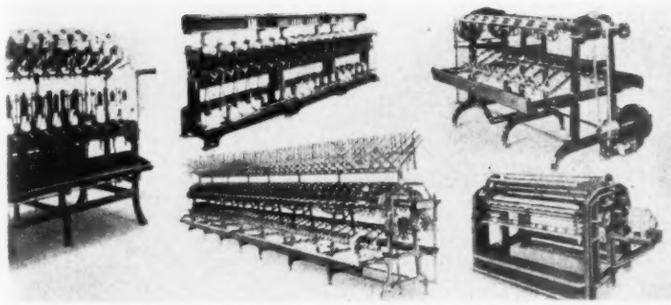
Winding Machinery

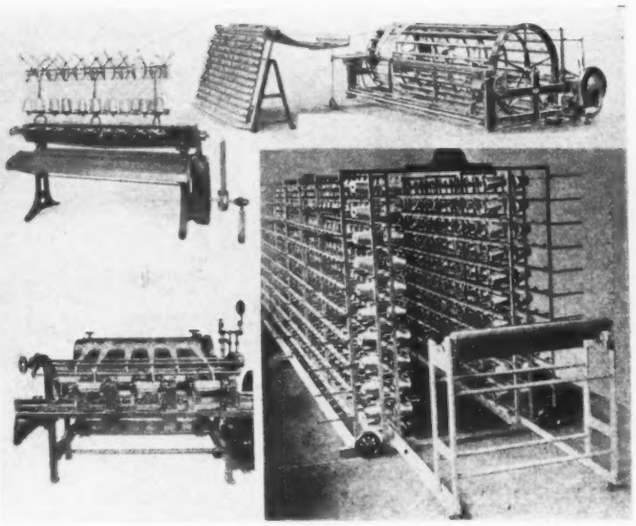
Winding-machinery developments include new or improved models giving increased speed, greater production, and lower labor costs than older types. For example, more even bobbins are made possible with one machine by means of a larger cam roll than is generally employed, on which spoilage is reduced by the use of oilless bearings throughout. Again, there has been brought out recently an improved filling winder of the type which permits bobbins or cops to be wound from skeins without intermediate winding. In a winder designed especially for winding rayon on cones for the knitting trade or on tubes for warping and weaving, special precautions have been taken to prevent quick change of tension, ridging, and cross-overs. For rayon knitting yarn there has been developed a winder having an anti-wear tension arrangement which moves the thread back and forth in the tension, thus reducing the wear. This machine is equipped with a new spindle drive providing gradual acceleration of speed.

To overcome oil stains another manufacturer is now equipping both single- and double-deck winders with spindle brackets having oilless spindle and shaft bearings. Three different spindle speeds are made possible by means of a three-speed, one-pulley arrangement, embodied in high-speed winder brought out recently in England.

High-speed production and extreme rigidity are two of the main characteristics of a recently developed reeling machine for rayon. This machine is designed to insure uniform diamonds and skeins of accurate length. The total yardage of the skein is positively controlled through a train of gears driven from the fly to the yardage clock. At the completion of the skeins the fly is stopped and a weight automatically returns the count gear to zero. A device which prevents the starting of the fly until the count gear has been reset eliminates double yardage and, as the operator cannot set the fly in motion accidentally while changing flies, also acts as a safety feature. The reel is equipped with a sensitive stop motion to stop the fly quickly and smoothly in case





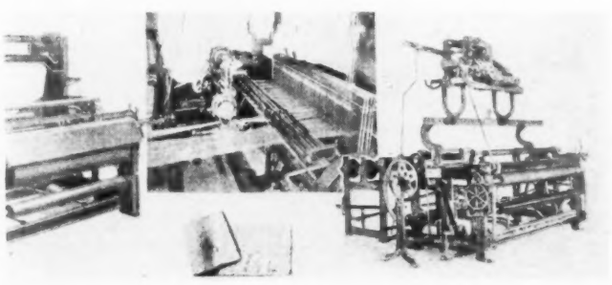


of a broken thread or the running out of the thread on the spool.

An interesting development is the adaptation of the principles used in high-speed warping of cotton to the warping of rayon. To do this the magazine cone creel with individual balanced tension on each yarn has been retained, together with the transfer system, providing a continuous run of warp yarns and the elimination of many knots. Rayon yarn, with its smooth surface and relatively wiry nature, requires a careful winding on the cone and good control of the yarn passing from the cone to the warper.

These characteristics of rayon also necessitate the handling of the material at a lower speed than that used in warping cotton yarn. The mechanical structure of the creel and the warper would in itself guarantee approximately the same yarn speed as for cotton, but for practical purposes it has been found that rayon can be handled successfully at a speed somewhat in excess of 150 yd. per minute and that the yarn can be so conducted to the beam and wound upon it as to maintain proper relationship and avoid slippage and overlapping of the yarns. For general purposes the magazine creel for rayon is built to carry about 500 ends of yarn, but the limit can be extended beyond this where mill conditions warrant. It is said that mills which have been experimenting with the new method of warping rayon have found the same general advantages which mills have experienced in warping cotton by the cone system. The economies are even more marked than those in handling cotton, it is declared, because the reducing of rayon waste is a more important factor in view of the higher price of rayon.

For mill and beam warping, from cones, tubes, or bottle bobbins, an over-end-delivery warper creel giving an open yarn sheet without crossed ends has been devised. With this machine uniform yarn tension is provided without the use of rotating tensions, thereby eliminating the ironing effect on the rayon. A heavy warper in which have been incorporated a number of improvements was placed on the market recently. This machine is fitted with a new-type of weightless beaming tension, roller bearings on main shaft and carriages, movable reel motion, and automatic yardage clock.



There has also been brought out a combined warping and beaming machine, with large and small reel, which is designed particularly for making warps for milanese looms.

Carding Staple Fiber

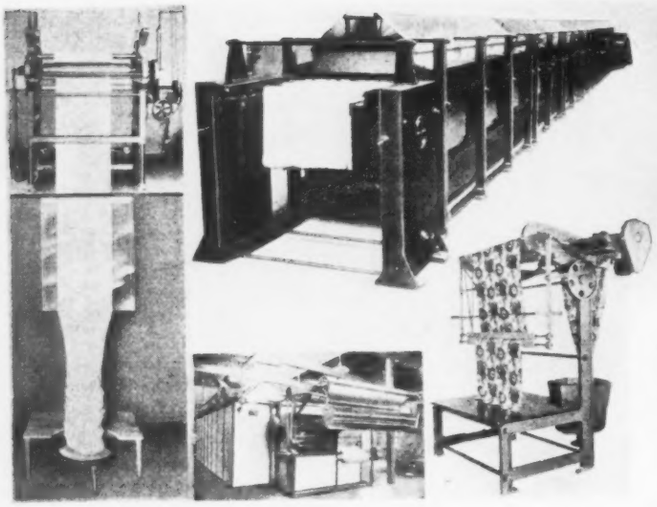
Staple fiber may be carded on ordinary cards which have been adjusted for that purpose, or better, perhaps, on machine built especially for synthetic fibers. The most notable development in this field is a simplified revolving-flat card, which employs less than half the usual number of flats. Tests with this new machine indicate that both as regards production and quality of work it is equal to the older type.

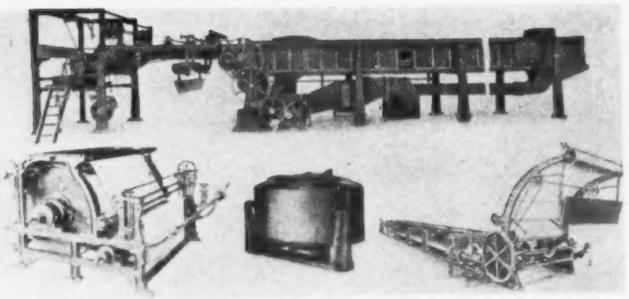
Warp Sizing

Equipment for warp sizing has shown several improvements designed to produce more even sizing and drying and better penetration of rayon. One of the latest machines to be offered to the trade is a rayon slasher equipped with automatic temperature control and three-roll, high-pressure quetsch. The quetsch is of unique construction and enables quick adjustment of pressure to give complete penetration of size with all types of rayon. There has been put out also a slasher intended specifically for the manufacturer of narrow fabrics who is confronted with the difficulty of sizing small-count warps.

In order that warps may be beamed on the loom beam in a cool state, and thus prevent contraction caused by the cooling of a hot warp, a cooling cylinder for sizing machines has been developed. This apparatus consists of a perforated roller, inside of which a spiral fan is revolving at a high speed. The roller is open on one end and closed on the other; through the spiral fan air is drawn into this roller. The air is then thrown out through the perforations and effects the cooling of the roller. In addition to the actual contact of the yarn with a cold surface, the cool air is blown on the warp through the perforations. The effect of this is that a warp is beamed on the loom beam in a cool state, said to eliminate any possible contraction caused by a hot warp cooling off later on the beam.

In addition to this cooling of the warp there is an oscillating motion, which is effected by the rotation of the roller and a cam motion. This oscillating motion is designed to wind the warp much harder than is usual and to eliminate any ridges or loose ends in either spaces or edges. It is said to be especially effective where the





flange beams are used, and does away with the uneven building up of the edges near the flanges.

Weaving Equipment

Various appliances have been placed on the market for adapting cotton looms to rayon weaving, and there have been brought out also a limited number of looms made especially for rayon. In Europe there has been introduced quite recently a silk and rayon loom embodying a number of new improvements, and another designed especially for weaving rayon. The latter loom is of wide framing and sturdy construction to prevent vibration, while the moving parts are built as light as possible. A modified form of side-lever underpick is provided; and the lay is of special construction, fitted with glass rods and velvet lining.

An improved paperless warp beam has been received with considerable favor. This beam is made with adjustable inside flanges which permit beaming as much as 3,200 yd. on a beam. Aside from the saving in paper, a number of other economies are made possible with paperless beams.

Improvements in looms and accessories used in weaving rayon include an attachment which permits a delicate beat-up of the pick; rubber covering for loom take-up drums, intended to eliminate star marks and similar injuries to the fiber; a let-off recorder for detecting irregularities in warp tension; and a new dobby jack which can be removed without taking the jack back out of the frame. Other innovations are an improved steel heddle, which it is said, cannot cause abrasion of the filaments during shedding, and Bakelite shuttles for rayon materials of a heavy nature.

A new motor-driven machine for twisting-in warps in looms equipped with warp-stop motions, or away from the loom, is now available.

There has been announced also a novel rayon shearing machine, fitted with spiral knives running in ball bearings. An automatic stop motion prevents seams or folds from passing under the knives and likewise stops the machine in the event that a needle or other foreign substance is in the cloth.

Knitting Machinery

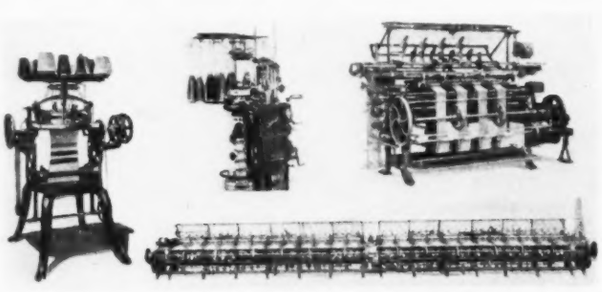
What is perhaps the outstanding development in full-fashioned machines is the application of variable-speed-motor drive to this type of equipment. This provides easy starting of the machine in any position; uniformity in the product under unusual conditions, such as plating; changing machine speed without changing the driving pinion and chain, and quick and easy adjustment of the machine to any speed between 600 and 1,600 r.pm.

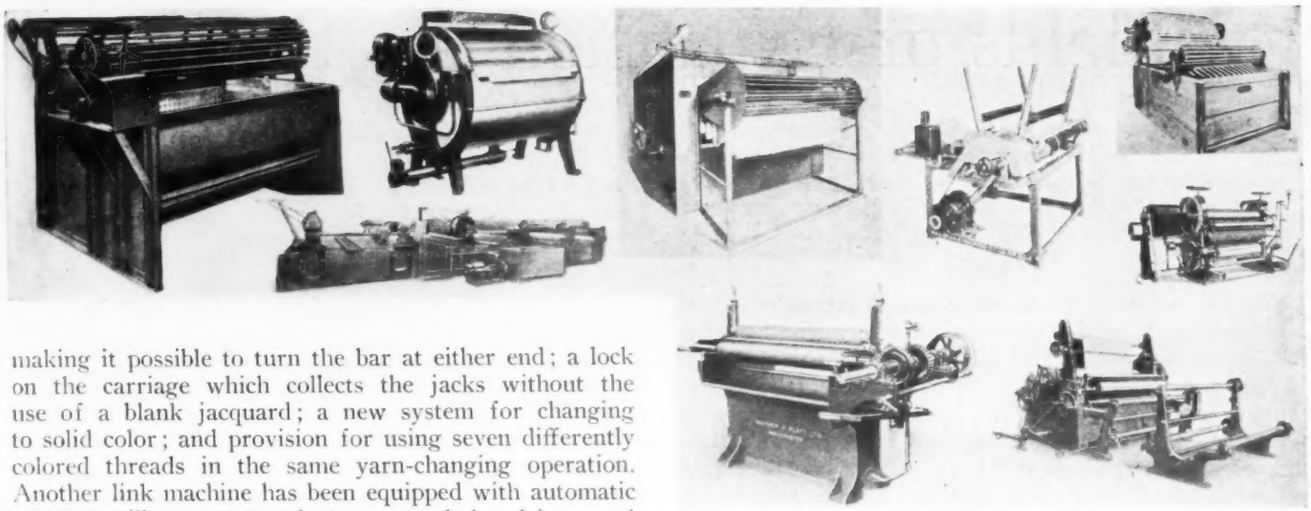
An improved full-fashioned machine brought out in England, which is said to require but three hand operations in knitting the leg, is fitted with centrally controlled carrier regulation and narrowing mechanism. A knitting machine shown at the knitting arts exhibition in Philadelphia included among its improvements single needle sections, new rocker motions, and new shock absorbers; this machine is also equipped with an automatic loose course, extra heavy draw cams, and a new shagging cam.

Improvements in equipment for the manufacture of seamless hosiery include the introduction of finer-gauged machines, development of new tension devices, production of various new types of reverse-plating and clocking machines, and advances in fancy top heads. Machines exemplifying these improvements include a 320-needle split-foot women's hosiery machine for making the popular inside-out stocking with heavy sole and neat finish; and another 320-needle machine for making single-, double-, and triple-pointed heels, and having an attachment for making clocks.

There has been introduced a 12-step, reverse-plating machine, so constructed that patterns may be changed quickly by replacing disks, without making other changes in the machine. Also of interest is a 260-needle wrap-stripe machine permitting change of colors during the operation. An outerwear machine placed on the market recently is capable of acting automatically in either direction as many times as necessary, and making twill back, jacquard effect, and one-and-one rib with striped effect. Another outerwear machine recently developed makes a two-and-one bottom and one-and-one rib with stripes.

The following improvements have been made on a link-and-link machine: control against bending or breaking of needles while racking; simple short-chain system with drums operated separately and stopped automatically; separate motion for jacquard bar, rendering unnecessary pushing in the jacks in order to turn, and





making it possible to turn the bar at either end; a lock on the carriage which collects the jacks without the use of a blank jacquard; a new system for changing to solid color; and provision for using seven differently colored threads in the same yarn-changing operation. Another link machine has been equipped with automatic vacuum oiling system, heavy rear-chain drive, and automatic opening of needle beds during racking.

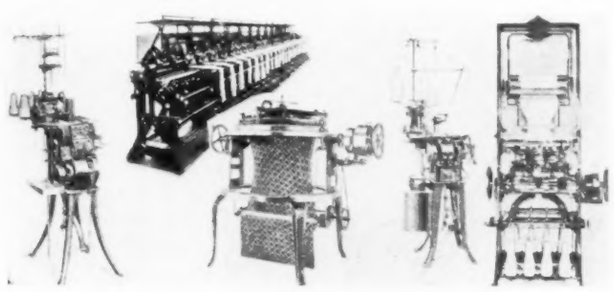
Fine-gauged machines have been developed for making a new gusset toe, so shaped as to fit the foot accurately and to permit the use of material in the toe and heel differing from the material in the leg without danger of the former material showing above the vamp of a low slipper.

Half-hose machines, both in 290-needle and 160-needle types, are now capable of making a differently colored wrap on each needle and making patterns by both the trick wheel and shogging of the finger cylinder. A machine for making half hose is equipped with five-finger stripe, and can make any combination of rib, including the English broad rib; this machine can also produce a French welt one-and-one, which can be finished either inside or outside. Other innovations are a bathing-suit machine equipped with pattern wheels, and making both welt and tuck stitches; and an underwear machine with improved reverse-plating pattern wheels.

Bleaching, Dyeing, and Finishing

Progress in bleaching, dyeing, and finishing equipment has been steady, although in some lines not as radical as in previous years. For treating rayon skeins a machine has been developed which transports the skeins through the treating and washing liquors at predetermined speeds. The skeins are supported by rubber-covered rods which are revolved forward and backward in such a manner as to expose each skein to the full action of the various solutions.

A circulating-type of skein dyeing machine, with special bevel on sides and ends designed to insure proper penetration has been brought out; and a spindle-type machine for small lots of yarn has been put on the market. Several new rotary dyeing machines for hosiery have appeared during the last few months. One of these is of Monel metal throughout and equipped with side drive to give greater flexibility. A random dyeing machine of unique design is now on the market.



Various makes of centrifugal and vacuum extractors have been redesigned to meet the requirements of rayon dyers. Piece-goods-dyeing equipment has been refined; and at least one new type of unit for continuous processing of rayon fabrics has made its appearance. This machine is said to give the benefits of full-width treatment without the harmful effect of a full-width tension.

A new all-metal reel dyeing machine of new design is equipped with an automatic switch which stops the machine should tangles occur, and a finger bar of the adjustable type which permits widening the spaces for wide or heavy goods and narrowing them for light-weight fabrics. Another reel machine embodying several unique features in design and construction has been announced recently. In Europe there has been developed a tensionless, constant-speed jig having decided advantages for processing rayon fabrics.

Improvements have been made in the design of dryers for skeins, hosiery, knit goods, and woven fabrics. These changes in general have been made to secure better air circulation and closer control of temperature.

A new finishing machine is a small, compact Palmer designed for use with any length or type of tenter and giving the operator a clear view of the goods as they come down the tenter frame. There has been developed also another finishing machine intended to reduce the high gloss of rayon to a soft silken sheen on both sides of the fabric. With this machine, it is said, any desired degree of hardness or softness may be imparted to the goods. In Germany a special calender for rayon has been brought out; and in England a pin tenter with adjustable air chambers to give efficiency in steam consumption. Two important developments in equipment for finishing knit goods are a vertical machine by means of which the goods are dried, framed, and pressed in one operation; and a horizontal tenter for warp-knitted fabrics.

A slitting machine for knit goods, designed to cut an entire roll of tubular fabric into strips and to roll it on a paper cone in one operation; and an opening-up machine which is said to open up goods at a speed of 40 yd. per min. without fraying are among the other types of equipment recently brought out for handling rayon fabrics.

Fields of Expansion for Rayon

By J. Guthrie Oliver

IT IS not many years since the chairman of a well known Lancashire cotton spinning combine described rayon with its metallic glitter as but a passing phase. There were at the same time enthusiastic founders of rayon concerns who talked in extravagant terms of rayon completely ousting silk and cotton. Both these views seemed wide of the mark at the time they were expressed, and while there are a great many people who do not regard rayon as likely ever to be more than a complement to the other textile fibers, the textile man who does not think rayon has come to stay will be very hard to find.

Two years ago when the first real overproduction slump overtook the industry, the limits of the fiber seemed almost to have been reached. Developments since that time have done much completely to change the views then held. The scientist is now looking forward to the time when all textiles will be synthetic.

It is well to take a level-headed and conservative view of the subject. Rayon met with its earliest success in conjunction with various of the older textile fibers, but the number of ways in which it can be used by itself is steadily increasing. Cotton has helped and supported rayon during its youth till it can now stand alone. It is like the young cuckoo in the nest of the older textiles. They have fed it and watched it grow. Are we going too far in continuing the simile? Will rayon eventually take possession of the whole nest? The view seems to be gradually gaining ground that this will be the case. Chemists believe that it is only a matter of time before a fiber prepared from cellulose will be more perfect than any of the natural fibers, though developments of this type are obviously of a very gradual nature.

Bearing in mind the natural charm of rayon there are three main problems which the research chemist is at present tackling with a view to increasing the outlets. These are strength, elasticity, and costs, and in all three of these the highly competitive state of the rayon market is proving a blessing in disguise; necessity is leading to steady progress.

There are several yarns now on the market which are claimed to have overcome the difficulty of the poor strength of rayon and at the same time maintained or improved upon its elasticity. The Lilienfeld process, although it is slow in developing, offers enormous scope. The writer has seen and handled yarns made from Lilienfeld staple fiber which have been as strong as Egyptian cotton of the same count and which have also compared favorably in elasticity. These yarns have been available only during the last few months, and it is understood that dyeing difficulties, which will obviously only be a matter of time in being solved, are preventing large-scale commercial development. Staple fiber by the Lilienfeld process has been marketed so far only by the Nuera Co. of St. Helens, England, and the view is held that Courtaulds have been holding back the commercial advent of the fiber until the technical difficulties in the dyeing have been overcome.

The Lilienfeld Process

Lilienfeld rayon was given wide publicity as a fiber suitable for making rayon sewing thread, but so far as Britain is concerned the question of price has resulted in a very poor response for rayon sewing thread. One of the main difficulties with Lilienfeld rayon is this question of price, but when we consider the way in which the special quality fine filament yarns have been reduced in price during the past year, and the extent to which they have displaced standard filament yarns in the cheaper quality fabrics, we have little cause for alarm and may expect developments in this direction in the next two years. The yarn has proved very successful in stockings. These are attractive in appearance and handle, and are practically untearable. The same remarks apply to underwear made from German Lilienfeld yarn which is already on the market. In both Great Britain and Germany the yarn is in greater demand than it can be supplied. The yarn is of as fine filament as most cuprammonium yarns and thus gives a warm soft handle. Single filaments are from 1 to 1.2 deniers and can be produced finer.

Developments in the production of strong yarns are

Rayon fabrics on display

not confined to the Lilienfeld process. It is claimed that greater progress has been with a new strong yarn produced by the I. G. Farbenindustrie. This is a yarn made on the Agfa-Travis principle from unripened viscose, and known as Tramyl. This is also being used for the manufacture of underwear. Both these yarns probably still have faults, but it would seem that the difficulty of overcoming these is only a matter of time. It is obvious that consumption of rayon will expand enormously when yarns of high strength and elasticity are available at something like the current prices of the rayon of today.

New Uses for Rayon

It is not only in the improvement and cheapening of yarns where progress in the expansion of rayon demand can be and indeed is being made; some exceedingly interesting developments have taken place with new uses for rayon in the last twelve months. In these the yarns in question have been just the ordinary recognized types of rayon, and the new uses have become possible by greater skill in twisting, sizing, warping, weaving, dyeing, finishing, etc.

Rayon has been introduced in various countries into high class sheetings and pillow cases. True this has been recognized as the novelty end of the trade, but a start must be made somewhere. Developments with stronger yarns may lead to a wide use of rayon for bed linen, and it is estimated that there is scope in this field for the consumption of several times the present total world output of yarn.

WITH every producing country suffering from over-production, the problem of finding new uses for rayon comes to the fore. In the accompanying article, the author surveys progress made recently, and summarizes views held by British and European experts as to future development

Another interesting development is the production of blankets in rayon waste. These, while certainly having warmth and an attractive appearance, are obviously less reliable than woolen blankets. They are likely, however, to become quite an important line simply on account of their attractive appearance and the same remarks apply to many other recent innovations.

Rayon Terry Toweling

Developments in textile machinery naturally play a considerable part in the finding of new uses for rayon. A particularly interesting example of this is in the recent improved terry motion which permits a terry pile composed of rayon to be woven. Rayon terry towelings are already an established fact, and it is expected that bath wraps in this material will be quite an important line by next summer. It is in fact considered that so far as immediate commercial development is concerned, this outlet is more promising than either the blankets or sheets, though both of these offer wider scope with improved yarns.

Umbrella fabrics manufactured of rayon have made surprising headway in Germany. All these recent developments are surprising when we think of rayon's failings of a few years ago. The mere suggestion of rayon for an umbrella or for a toweling, both of which have to withstand water, would have been ridiculed at one time.

To realize the possibilities of the many new types of rayon fabrics, we have only to look back at the progress made in dress fabrics and other lines where rayon has become firmly established. When we compare the all-rayon crepes, satins and taffetas of today with the crude rayon dress fabrics of four years ago we see what truly remarkable progress has taken place. For several years now we have had rayon fabrics which are guaranteed fast to light and washing and withstand a rigorous boiling test. Equal if not greater progress has been made with rayon furnishing fabrics, and rayon linings have gone a long way toward displacing some of the older materials.

Improvements in Existing Fabrics

In velvets there are many people who hold that rayon has definitely gone ahead of real silk. In these we have rayon fabrics which are not only washable but have a pile which always goes back into place. The dyeing and printing qualities of rayon velvets are moreover superior to any other type of pile fabric. Remarkable progress has also been made in imitation skin pile fabrics, and though these have yet to attain the strength of the similar mohair material, they have certainly surpassed it from the standpoint of color, variety and attractiveness. It is also believed that weavers are now on the eve of introducing a genuine poplin fabric in rayon with a true repp weave. There are infinite possibilities in the development of such a fabric.

On the knitting end consumption of rayon has been surprisingly large for a number of years. There has been an exceedingly large consumption of rayon hose and underwear in all the leading countries. Despite the huge consumption these have not really been satisfactory productions. There have always been many complaints, and especially in hose it has only been the cheapness and attractiveness which has made them sell. Quite apart from the references made above to the use of strong yarns, however, important developments with the improvement of machinery are resulting in rayon knitwear possessing just the qualities which it has been lacking in the past, viz., strength and durability. Fabrics made on the "Maratti" system and various other new processes seem destined to vastly increase the competitive powers of rayon underwear and hose.

Freak Uses for Rayon

There are many other examples of what must at present be described as freak ways of using rayon. TEXTILE WORLD readers will be familiar with such interesting developments as rayon in suit cases, while in Great Britain considerable importance is attached to the use of rayon fabrics for the fancy shoe trade. The future may bring with it many alterations and modifications as to the relative importance of the various processes, and there is quite a strong school of textile men who hold the view that in the not too distant future, with increased strength and elasticity, spun rayon yarns made from staple fiber will become as important if not more so than continuous filament yarn. The fact that acetate producers are now taking up the production of this type of rayon is certainly a point which may be credited in favor of this view.

Rayon Must Regain Price Stability

A Summary and Interpretation of the Year's Market Developments

By John Black

Assistant Editor, TEXTILE WORLD

DEVELOPMENTS in the rayon yarn market in the last twelve months have been far from satisfactory. The outstanding difficulty was a lack of confidence regarding prices. Since the appearance of the 1929 Rayon Issue, the market has had only two moods: either it has been hesitant, anticipating a price cut, or it has been convalescent following one. Prices in many cases became a football of caprice; there was so much juggling of quotations, so many concessions and rumors of concessions, that producers who tried to hold to list found that policy a difficult one to maintain. Rayon enters the fall of 1930 in a firm position, so far as consumer acceptance is concerned, but regrettably uncertain at the price end. This instability is due partly to the hesitancy which has prevailed in all lines, and partly, it must be admitted, to a deplorable lack of definite price policy among producers.

The fall months of 1929 were marked by good demand and reasonably firm prices. The stock market debacle did not affect conditions immediately. Intelligent, well-directed promotion helped to widen the outlets for synthetic yarn. In March demand eased off and there were reports of underselling. Price weakness, particularly at the acetate end, became pronounced toward the end of the month, and a new problem developed in the growing call for sub-standard yarns. The volume of business at this end soon became disproportionate to the actual output of inferiors, indicating that quantities of standard yarn were being sold at the prices of sub-standard.

Meanwhile, there were reports of a pending rayon price cut. Rayon producers were giving attention to the curtailment question. One company was already operating on a curtailment basis, having announced a 15% reduction at the end of February. April found several others running below capacity. The problem of inferiors competing with standard yarns was at least temporarily solved at the end of April when numerous producers cut the price of inferiors to 80c. thereby making it less profitable for the trade to sell standard yarns at the price of inferiors. This had a helpful effect on a market now generally weak, but speculation regarding a price cut continued and held back buying. Early in May the principal producers announced a downward revision, running from 15c. to 50c., but restricted for the most part to the finer sizes. This cut received general approval, as it was interpreted as stimulating the call for finer yarns. It had this effect, to an extent, but the business depression prevented any real pick-up. There were frequent reports of sub rosa concessions and inducements being offered. With the close of May production of yarn was 30 to 40% below capacity, with promise of further reduction. The lull became so acute that some producers cut output to 50%.

The July Price Cut

The low level of raw silk prices was a growing problem, and toward the end of July it presented such serious competition to rayon yarns that fine denier sales showed a sharp drop. The raw silk situation plus underselling among producers themselves brought about a general price cut which was announced the last week of July. This cut was drastic, and narrowed the margin of some producers to the point where there was doubt as to whether they could continue to do business profitably. The cut ran from 20 to 27c. on all popular sizes; the biggest selling unit, 150-filament 24 denier, dropped from $1.15 to 95c. Instead of solving the problem of price weakness, this reduction merely made manufacturers more hesitant about commitments. There was a slight improvement in early August, but the consuming industries did not regard prices as stable; they expected still another cut and refused to buy more than actually needed for immediate consumption. The market weakened, and sales for August were estimated to be 50% below the same month in 1929. Economists had predicted that September would mark a turn for the better in all lines, but manufacturers were skeptical.

So general was the uncertainty, that only a few weeks after the July rayon reduction, manufacturers began agitating for a guarantee against future reductions. This price guarantee issue hindered sales, and finally several leading companies announced that they would not offer any such guarantees; that such a step was illogical, impractical and unnecessary. This announcement cleared the air somewhat, but there were reports that certain producers were still offering such guarantees on the quiet.

The year clearly has been an unsatisfactory one. Price stability, once an outstanding point in selling rayon, has gone by the board. At present, prices are not stable. Certain producers try to hold to list, which is difficult in the face of general underselling. The problem is one of the most important that has ever faced the industry. Manufacturers are skeptical of list quotations, and will not buy ahead. Producers discount this skepticism, so far as the demand for a price guaran-

tce is concerned, and claim that the prevailing industrial hesitancy is the real issue. They believe that once finished goods sales improve, rayon will automatically steady itself and continue its normal progress. To a degree, this is sound reasoning, but it is not easy to win back confidence, once that confidence has been lost. A broader attitude on the part of the rayon producers, an acceptance of the principle that "what injures one eventually will injure all" is needed, to regain good-will.

At time of going to press, industrial confidence seems to be coming back slowly, and textile manufacturers are considering increasing their output. Rayon producers still feel the slump, and sales are not good; inquiries are numerous, however, and the outlets show signs of interest. The prospects are for a slow improvement through the fall months.

A Lesson for the Industry

The experiences of the past year carry a lesson to the rayon industry which, properly assimilated and acted upon, could conceivably make 1931 a year of banner business. There were certain constructive trends during 1930, the chief of which was the readiness to curtail output, when confronted by a weakening market. Without this prompt action, prices unquestionably would have been softer. Unfortunately, the curtailment was not general enough, and there were times when it seemed to penalize those who had the foresight to take this constructive step.

Considering the possibilities of the rayon industry, its constantly growing consumer market, and the ceaseless advance being made toward production of finer yarns, it is particularly unfortunate that lack of vision and lack of firmness should be allowed to hold back its progress. There is a market for all yarns; the solution to acute competition lies in the development of new outlets, not in the butchering of prices, and the sooner this principle is recognized and accepted the sooner prices will assume that stability essential to confidence and progress.

World Watching Japan's Rayon Industry

RAYON producers and manufacturers throughout the world are watching the growth of the Japanese industry, which is steadily having a larger effect upon the industry as a whole. In common with other rayon producing countries, Japan has suffered to some extent from over-production, and during the early months of this year the leading companies decided to restrict production. Output during the first half of the current year totalled 13,200,000 lb., which is considerably smaller than the total capacity at present, about 37,000,000 lb. a year. Production is largely in the hands of five large companies. Details of their estimated output capacity are as follows:

	Lbs. per year
Teikoju	11,880,000
Toyo	7,260,000
Asahi	5,940,000
Nippon	3,960,000
Showa	3,960,000
Others	4,000,000
Total	37,000,000

Japan has gone ahead rapidly as an exporter of rayon yarns during the current year, and in the first six months the total reached 474,408 kin valued at Yen 811,900. This compares with 115,408 kin valued at Yen 182,795 in the whole of 1929 and 51,116 kin valued at Yen 113,692 in 1928. The great bulk of this is sent to China, but business with Australia, Mexico and the United States is getting larger. Business has declined somewhat in recent months, and the June figure was much below the average. This is undoubtedly due to the unfavorable conditions which prevailed in China with the decline in the value of silver.

In the export trade in cotton and rayon mixture fabrics, Japan made good progress in the early months of this year at a time when both Britain and Italy were feeling the effects of the world depression. There has, however, been a tendency for business to decline, and the May figure, the latest available, is below the average for the first five months. The May exports to India. The comparison for the five months, however, shows a substantial gain over last year. The total is in fact nearly twice as large as last year despite the fact that business with Chinese markets showed a very marked decline. There was a small increase with the Philippines, while Indian takings are nearly seven times as large, the Dutch East Indies nearly two and a half times as large and the Straits Settlements twice as large as last year. The margin over and above last year was mostly made in the first quarter of the year and has since gradually declined. A notable feature is the headway Japan is making in Australia and Canada, and this is particularly marked in April and May.

It is almost certain that when the returns for the later months such as July and August are available they will show a less satisfactory position, but rival manufacturers must not take too much notice of this as it is only natural that Japanese manufacturers should feel the effect of the world trade depression.

Sunset on the Inland Sea, Japan.

The Real Fight Still to Come

in European Rayon Industry

DURING the last four years, sections of the European rayon industry have had to pass through a series of crises. The success which attended the leading companies resulted in much new money being introduced into the industry. In many cases the glittering profits of the older companies were the main incentive, and the fact that one day output would catch up to demand never occurred to the promoters of these concerns.

The first period of depression occurred in 1927 and largely affected the Italian industry. 1928 saw very substantial increases in production in nearly every European country. The two countries where the situation became most severe were Italy and Germany, but in both these countries the leaders of the industry went about the task of putting matters right in a business-like manner. In Germany a price convention which did away with unnecessary competition had been working since 1926, and might have continued had not the market become swamped with foreign yarn. The Glanzstoff Co. made valiant efforts to carry out its old principle of allying itself with every competitor, and succeeded in reducing Dutch competition by amalgamating with the Enka Co. and forming the now well-known A.K.U. This new company gained control of virtually the whole of the Dutch industry and a very large section of the German industry. Every efford was made to fix up an alliance with the Soie de Chatillon Co. in Italy, but up to the present time no such agreement has been reached or seems likely. The probable remedy will eventually be the raising of the German import duty. In Belgium a working agreement between the leading producers also met with a considerable amount of success.

Rapid increase in rayon production, coupled with world-wide trade depression, has resulted in severe competition in Europe. Production is bound to be limited. Sound rationalization plans can lessen the fierceness of the impending struggle in this industry.

A year ago it seemed almost as if the industry was about to enjoy a relatively prosperous period. Many rationalization schemes had been put into practice. The following six months, however, were destined to see the industry head further into the slough of despond. There were many reasons for this, and at the time of writing it is clear that the industry is just beginning to get to the point where the real fight will have to take place. Among the many serious factors which have impeded the industry during the last twelve months the worst is the general world trade depression which has had the effect of speeding up all the other impending troubles of the industry. One of the most acute factors has been the American situation, and to what extent this is going to alter the whole structure of the European industry is difficult to tell at the time of writing. As readers of TEXTILE WORLD are well aware, the old trouble of over-production, which has been affecting Europe in varying degrees since 1928, had largely escaped America until 1930. This year has, however, seen the American market practically shut out from Europe. The worst effect recently has been upon Germany, a very large supplier of yarns to America. It probably would not have needed a tariff to keep out Germany as it was obvious that the Glanzstoff Co. would not continue in competition with its subsidiaries after the latter were in a position to meet the demand, and the same remarks apply to Holland.

The prospect of the loss of the United States market had probably much to do with the formation of the A.K.U. a year ago, and it certainly was one of the main causes of the Glanzstoff attempt to form the German Rayon Pact this spring. The pact, which unfortunately for German producers has not worked out in practice, was to enable the home producers to supply a minimum of 90% of the consumption, and thereby counteract the loss of trade in the export markets. This would in its turn have seriously affected the situation of the Italian, Dutch, French, and Belgium rayon producers, who are all important exporters to Germany.

It now seems almost certain that the German market will also be largely limited by the imposition of higher tariffs. The American tariff proved in itself to be a handicap to European importers, but being followed as it was by a substantial reduction in prices, it virtually cut off the United States market from Europe.

Another serious factor which is bound to become more acute in the next 12 months is competition from Japan. This has so far chiefly affected Europe by offering severe competition in the rayon fabric trade and thereby reducing the European market for yarns. During the current year, however, Japan has commenced to export rayon yarns to China, and it is probable that competition with Italy will develop to a really serious degree in the near future.

During the current year Italy has made up for lost ground in America and China by increasing her sendings to Germany and the smaller European countries. This on the other hand has made matters more difficult for the companies in the said smaller countries, and so the cycle of increased competition goes on. Holland has already limited production to some considerable extent as a result of the formation of the A.K.U. but stocks in that country were very heavy at the beginning of the year, and by maintaining exports at a very high level the position has been improved. In France there have been many rumors of cartels greatly extending the scope of the Comptoir des Textiles Artificiels, but these have been freely denied.

Thus many efforts for the placing of the industry on

a sounder footing are taking place in all the leading European countries. Most of the efforts are, however, temporary measures to stave off the evil day, and get rid of present stocks. It is obvious that there will have to be limitation of production in Europe. Unless there are some very large cartels at work it is very unlikely that this can be done on organized lines, and it must to some extent be a case of competition and the survival of the fittest. It will of course be pointed out that this is a wasteful method, as in killing off the smaller units the larger ones impair their financial positions. Therefore the more rationalization which can be carried out on a mutual basis the better for the industry as a whole.

In the case of Germany, the general feeling is that to a large extent its problems could be solved by the introduction of a protective tariff. In Italy the problem is much more complex. The Snia Viscosa and the Soie de Chatillon are on fairly friendly terms, and the general belief is that a complete amalgamation is aimed at between the two companies. Chatillon interests are, it is believed, trying to break away the Snia concern from the Courtauld and Glanzstoff interests. Presuming that the control of the Italian industry does become centralized the problem of disposing of their yarns will still remain, but if this is found impossible a limitation of production will be fairly simple. Italian producers have the advantage of relatively low production costs, and it is certain that they will offer exceedingly keen competition to the producers in the smaller European countries. In some cases these will certainly have to go out of business, and in others they will succeed in fighting Italian competition by persuading their Governments to increase their tariffs.

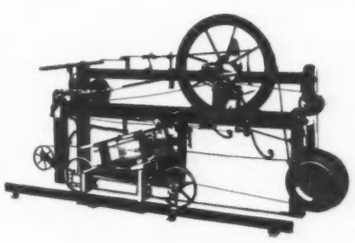
The matter will be further complicated by the fact that France who in the past has largely been able to absorb her own yarns is now very much dependent upon the export trade. Hence in many markets it will be a case of Italy versus France. In the past it might have been said that France was well ahead of Italy so far as quality yarns are concerned, but Italian producers can now turn out yarns by all three processes which compare favorably in both cost and quality with those of any other country, even including Germany and Great Britain. It is certain that both these countries will increase their home consumption by the manufacture of export fabrics, and it is probable that the Italian producers will market these themselves, in much the same way as the Comptoir is now doing in France.

To sum up it may be said that the biggest fight in the European industry has yet to come. Production is bound to be limited and it is obvious that many producers will prefer to fight before putting this into practice. We may expect a further serious price war, and those firms with strong financial backing, which in Europe are unfortunately few and far between, will have a big say in who is going to be left standing at the finish. As already indicated the more firm agreements that can be fixed up the less fierce will the battle be, but as things stand at present we can only predict a cruel and bitter struggle.

Rayon Gains in Favor
with British Public

IN GREAT BRITAIN the rayon industry, both technically and from the viewpoint of consumption, continues to make steady progress, despite the depression in trade, and the fiber is becoming more important with relation to the older textiles. The last twelve months may be said to have been by far the most difficult period the industry has yet had to undergo, but in the public eye rayon has probably never been so favored. Financial and political aspects have been responsible for the difficulties in the rayon industry, which has been suffering from serious over-production. The British public is now losing money on account of the Stock Exchange booms in rayon flotations which took place in 1926 and 1928.

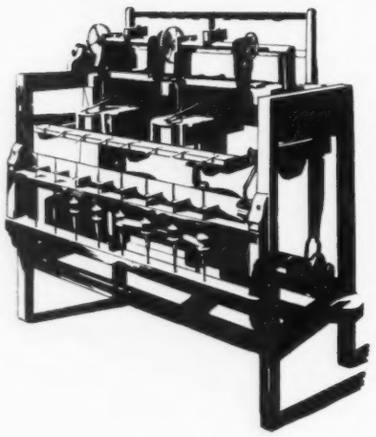
The imposition of the "Silk Duties" must be held responsible for the first rayon flotation boom. In 1924, the year prior to the imposition of the silk duties, British production was approximately 24,000,000 lb. and the industry was working to full capacity. At present the annual rate of production is about 50,000,000 lb., which is largely being consumed. However, the present rayon capacity is in the region of 80,000,000 lb. The 30,000,000 lb. difference between capacity and production is partially represented by plants which are closed down and which stand very little chance of ever being reopened.



It is a significant fact that, although there have been some 20 public companies formed since 1924, none of these has ever succeeded in reaching the profit-earning stage. The only public companies to achieve this are the three who were in existence prior to the duties.

About last Christmas, the Chancellor of the Exchequer made a statement in which he threatened to remove the silk duties in April, 1930. Although rebates on duty-paid stocks were promised, the retail end of the trade to a very large extent held back from buying rayon fabrics and the amount of yarn sold during this period was very much below normal. For months a number of the smaller companies had been trying to come to an agreement on the question of prices, and when it was found that the duties were to be retained they fixed a special limited price list. The move however was completely set at nought by an announcement that Courtaulds, the leading company, had lowered their prices to a level lower than that agreed to by the group of smaller companies. This move by the leading viscose company was partly a reply to the reduction made by the Celanese company a few weeks previously, partly a direct hit at the smaller companies, and also to try and pave the way in the event of the removal of the duties in April.

Since the April price reduction the market in Great Britain has noted an



interesting change in demand for rayon yarns. This reduction brought medium fine filament yarns more in accordance with the low level of standard filament yarns, which had been substantially reduced in price at the close of 1929. The result has been that standard filament yarns have gone very largely out of favor and their place has been taken by medium fine filament yarns. Now where a yarn of 150-denier 24-filament was previously used a 36-filament yarn is substituted. This price reduction made it practically impossible for the smaller companies whose plants had been closed down to reopen, and many of them had large stocks of standard filament yarns for which there has been practically no market.

Fine Filament Yarns

The stocks in question seem to stand very little chance of being reduced. The present price level is exceedingly competitive and those firms which are still in business, apart from the leading company, are concentrating on special fine filament yarns. Competition even in these special qualities is keen and firms with a fair profit margin in specialty yarns last year, will have it reduced.

The question whether or not the "Silk Duties" are to be retained next year will as matters seem at present have very little effect upon most of the smaller companies, as they seem destined to pass out of existence even under present conditions. These remarks apply particularly to viscose. To those who favor the removal of the duties it must be said that if they had not been in force during the current year Britain would have become a dumping ground for all the European countries, and the same condition would probably apply a year hence.

The acetate section is of course dominated by British Celanese, who have not so far met with much competition, except through the steady lowering of viscose prices.

Acetate Demand Maintained

As far as can be seen at present, the demand for acetate rayon in Britain is being well maintained, and is likely to go on increasing. There are certain purposes for which acetate has been found particularly suitable and these uses are likely to provide an increasing demand. Against this view, which is generally held, must be pitted the possibility of a decline in demand for acetate similar to that which has recently taken place upon the Continent. This decline was believed to have been partially due to the extremely low prices of fine filament viscose, but this effect has not been very marked in Great Britain. Another view of the Continental decline in acetate demand was the competition from cuprammonium. This is partly contradicted, however, by the fact that acetate demand was well maintained in Germany, where cuprammonium has a very large consumption.

In the event of the British silk duties being removed, it is very uncertain what the effect would be upon British Celanese. There is quite a large output of acetate rayon in France and Belgium, which has not been selling freely lately and it is quite probable that this would be dumped in Great Britain. There would also be additional competition from both cuprammonium and viscose yarns.

In the event of the duties being retained the Celanese company must expect further competition from the new Bemberg company which is expected to commence production of rayon at Doncaster in the near future. At present there is only one small cuprammonium plant working in Britain and that is run by a private company, "Brysilka." Whether the Bemberg plant will be continued in the event of the duties being removed is not clear. It has been possible even since the April price reduction to send in cuprammonium yarns into this country, especially in special crepe qualities. One of the main reasons for starting up in Great Britain is said to have been the difficulty in transport of warps on beam.

POPULAR acceptance of rayon in Great Britain makes rapid progress. Competition, however, is tremendously keen and heavy mortality among producing companies seems certain. Despite difference of opinion on silk duties, their removal would work hardship on both yarn and goods manufacturers through foreign dumping.

Fear Removal of Duties

Perhaps more than anything else, the manufacturer of rayon fabrics is fearing a removal of the duties on rayon piece goods. Even despite a duty of 2/- per pound, rayon piece goods imports have continued to increase during the last few years, whereas yarn imports have fallen away. The weaver and knitter would rather face an increase in yarn prices with all the new problems that would present, than lose the advantage of the tariff on piece goods.

A removal of the duties which have been levied upon yarns would only tend to upset the stability of the market, and prices are generally considered to be low enough for most purposes. Those yarn producers who were in a position to carry on after the removal of the duties would certainly find the market limited by the importation of piece goods and made up fabrics. There is therefore practically no section of the British rayon industry which would welcome any removal or alteration in the silk duties.

In the event of the duties upon rayon being maintained the British industry should continue to progress, though there is bound to be a big mortality among the yarn producing companies due to the acuteness of the competition problem.

Widening Acetate Field to Five Companies Makes New Outlets Necessary

WHAT is ahead for acetate yarn? Will the rapid rise in output of this yarn by a steadily widening group of rayon producers mean more acute competition in 1931, or will the development of new consuming markets be adequate to assimilate the increased production? This question is being asked generally in the synthetic yarn industry today, and it is important enough to merit serious consideration.

Roughly estimated, the production of acetate yarn in this country in 1930 will be more than 12,500,000 lb. This is an increase of nearly 75% over 1929.

Up to about a year ago, the Celanese Corp. enjoyed almost absolute control of this market, being the only domestic producer. The first competitor on the scene was the American Chatillon Corp., which has since merged into Tubize-Chatillon Corp. This company made fast headway in the acetate field and today the yarn produced at the Chatillon plant at Rome, Ga., is being sold so widely as to have a definite effect on the market. Chatillon's output of acetate last fall was largely nominal, and it was not until the turn of the year that production began to assume important totals. With the end of the first quarter of 1930, this company was enjoying a good turnover on this yarn.

INCREASED acetate yarn production demands increased outlets. Consequently the situation calls for sound merchandising effort, not price wars. The standing of the firms now in the field augurs well for such a trend.

Meanwhile, the acetate plant of DuPont Rayon Co. at Waynesboro, Pa., had begun operation and this company went through the usual period of preliminaries. This period was brief, thanks to advance work done, and to the company's previous familiarity with acetate yarns through its importing business; by late spring DuPont's acetate yarn was available to consuming industries in quantity.

With the completion of the Viscose Co.'s acetate plant at Meadville, Pa., this summer, the third of the new group had made its entry. The Viscose Co.'s output is still nominal and big-scale production probably will not develop before next year. The fourth entrant was Tennessee Eastman Corp., Kingsport, Tenn., which is conducting experimental operations at present.

This situation, obviously, means important changes in the acetate picture. Certain effects have already been felt; others will register as production and promotion develop further. The current year is fraught with much significance for producers of acetate process yarn.

With the advent of Chatillon yarn early in summer and the rapid growth of the newer DuPont yarn, acetate yarn prices softened. Consuming industries found quotations very uncertain. There was a pressure to sell, and weavers had no difficulty in getting concessions of various kinds. This weakness lasted all summer, with a firming manifest in August, and today, though prices have not changed, producers are somewhat more confident. They believe that prices now are at bottom and that the coming months will bring strength. Certainly, the fall should bring a normal improvement.

The question is—will this be merely a temporary steadying?—a steadying which will be lost as soon as Viscose Co. acetate yarns are manufactured in quantity? There is no immediate answer to that question, but there are certain signs, analysis of which offer a gauge for judgment.

Producers are not fooling themselves about the 1931 prospects. Several who discussed the issue, said frankly that they look for a difficult situation to develop next year. Keen price competition may be the outcome, resulting, as one producer put it, "in a real scrap." That such is neither desirable nor constructive goes without saying. Producers are still hopeful that development of new markets may solve the problem. Much progress was made in that direction during the current year, and the results were encouraging.

Acetate's potentialities are still considered to lie mainly in the woven field, but sales of acetate yarn to knitters for the production of high-grade merchandise are increasing. In the woven fabrics, linings and taffetas are outstanding. Two types are used for linings: all-acetate yarn and acetate mixed with other synthetic yarns. The call for acetate satins is widening and panne satin is becoming important for coats and suitings. In knit goods, bathing-suits made of acetate fabrics are winning wider acceptance, and acetate also is used for decorations on sweaters.

Perhaps the most significant element is the tendency of producers to get closer to manufacturers. This is the real key to wider markets, and this approach, properly developed, could conceivably broaden demand to such an extent as to solve 1931's problem of selling a greatly increased output. Producers are trying to get away from haphazard advertising and to bring promotion in line with actual sales. Servicing is emphasized, and technical instruction in weaving and knitting now is thoroughly organized. It is recognized that mills must get technical help, to achieve the best effects in acetate fabrics.

These efforts to widen the consuming market are a good augury for the immediate future of acetate. It is here in the main that the price problem's solution may be found. The price fluctuations of acetate yarn this year were not alarming in themselves, and at present acetate yarns are steady, if not steadier than other process yarns. The experiences of the year show the need for greater coordination of effort toward wider acceptance of acetate yarn. As one producer put it aptly: "Price-slashing is no solution. The consuming market's possibilities have scarcely been touched. There is room for all, and room to spare. But we must maintain stability; anything else would bring chaos."

The Rayon Outlook

As Viewed by Producers

WHILE recognizing the seriousness of the situation in rayon and other synthetic fibers, producers see signs of improvement and predict continued expansion for the broad future. Here are a few representative comments, made for TEXTILE WORLD:

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Hiram Rivitz, president, Industrial Rayon Corp.:

"I am of the opinion that we have finally made the turn and that we are now on the up-trend, almost imperceptible at the moment, but noticeable nevertheless both in volume and firm commitments.

"Whereas heretofore our customers were constantly revising their orders, reducing specifications or holding up shipments, we are now experiencing a reversal of form, with requests to increase specifications and anticipate shipments. We regard this sign as a healthy indication of confidence in the trade, and while this may be partly due to a temporary seasonal demand, we feel that a forward stride has been taken and that the trend is upward and will continue, for the very good reason that merchandise stocks all along the line—wholesalers, department stores, chain stores, commission houses, etc.—are completely exhausted, and the present low price of rayon is bound to reflect in the purchasing power of the public in greater volume than ever before.

"I believe in the future of the rayon industry, and those of us who are in the business of producing rayon and are economically and financially sound will emerge from these temporary depressions better able to cope with the problems of the day. The future of rayon is beyond the calculation of any reasonable forecast."

●

C. M. Carr, vice-president, American Enka Corp.:

"The rayon market seems to be improving. In our opinion this is due not only to the wider use of rayon yarn, but to the generally improved yarn made during the past year.

"The finer deniers and multi-filaments which we are spinning along with the more standard numbers have met with very satisfactory acceptance.

"It is generally accepted that the present prices on rayon yarn have had a stabilizing effect and have given weavers and knitters greater confidence to proceed with their operations. This should produce a favorable effect on the future market.

"Although 1930 has been a bad year for textiles, we are gratified with the amount of yarn we have been able to produce and distribute during our first year of operation."

●

Leon H. Ryan, general manager, Delaware Rayon Co.:

"The rayon industry is passing through the most critical period in its history. Overproduction, at a time when consumption has been below normal, has resulted in large stocks accumulating with the inevitable result of reduction in price. This situation appears to be better now, due to the fact that a number of plants have curtailed their production, and it seems also, that it will not occur again. It is doubtful whether the reduction in prices has resulted in the use of rayon yarn more extensively. With present levels in effect prices should remain stable which as soon as business conditions return to normal should result in the increased use of yarn.

"The fact that rayon goods still maintained their popularity when the price of raw silk was cut so drastically is conclusive proof that rayon cloth of good quality will maintain its place in the textile field regardless of competition from other commodities.

"We look for increased business throughout the balance of the year due to the fact that stocks of finished rayon goods are very low."

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Ernest C. Morse, director of cooperative merchandising department, American Bemberg Corp.:

"The new Bemberg price levels recently announced make possible for the first time in the United States volume use of high-grade cuprammonium yarn. Even at the previous higher price levels, the first six months of 1930 showed a 40% increase in sales of Bemberg yarn as over the same period last year. The naming of the new prices followed twelve months' analysis of Bemberg production and distribution costs, together with increased production efficiency. The adjustment of production to economic changes, modern merchandising science, research into the fundamentals of manufacturing technique, careful study of the possibilities of new outlets for, and extension of, existing use and adaptation of the product to meet consumer demands have opened the way to a volume market made available by the new low prices."

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J. E. Bassill, vice-president, Tubize-Chatillon Corp.:

"While the long looked for betterment in the movement of yarn has not yet fully materialized, we have within the past few weeks seen very definite signs of improvement, particularly in our sales to the hosiery and underwear industries.

"On certain new numbers, notably 125 denier and 150 denier Chardonize, we are actually behind on deliveries and production is being increased as rapidly as possible.

"We are also being pressed for deliveries on our viscose process yarns, and it has been necessary within the past month to bring the production of this yarn up to capacity.

"With stocks of finished goods in the hands of wholesalers and retailers almost at the irreducible minimum, and the movement of the physical volume of goods at levels but slightly below that of last year, we anticipate an insistent and growing demand during the next few months, especially for dull luster goods.

"As for next year, we are fairly optimistic and we hope that the lessons which we have all learned in the past year will be used to the benefit and profit of the rayon producers in 1931."

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E. E. Boreham, vice-president, Celanese Corp. of America:

"Judging by the increased demand for Celanese yarns and fabrics, it would appear that the textile market generally has taken the upward trend and can look forward to a year of increased prosperity. The field for Celanese yarns is widening greatly and new uses for our yarns are being found regularly in the weaving, knitting and allied fields. During the past year many new Celanese fabrics have made their appearance, and the new weaves, prints and color effects have been very favorably received by the ready-to-wear manufacturers and the piece goods departments of retail stores. For all our products we look forward to a period of healthy activity."

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R. L. Brunet, president, Woonsocket Rayon Co.:

"The present rayon situation, while unsatisfactory in many respects, holds possibilities for general future good to the producers as well as the users.

"The general situation with reference to the sale and use

(Continued on page 176)

Present Rayon Price Levels Disastrous

By Dr. F. C. Niederhauser

Vice-President and Managing Director
Carolina Rayon Mills, Inc.

THE rayon situation is extremely unsettled and while one hears encouraging remarks from certain sources, especially from the consumers, from the rayon producer's angle, particularly from their respective selling outlets, reports are less encouraging.

Coming in contact with both sides—that is, producers as well as consumers—it would be my opinion that unless producers realize promptly that selling prices must be stabilized, and especially stabilized at somewhat higher levels than those now existing, it will result disastrously for some of the smaller producers; which result, in my opinion, would not be helpful to the industry.

The consumer, on the other hand, must be given reason for confidence which he is not given at the present time.

While prices have been revised in accordance with schedules published on or about July 22 by the various companies, it is positively a known fact that even these low schedules are not adhered to by certain producers. It is impossible to establish confidence in the minds of the consumers when they are able to purchase in spite of published prices, their requirements at substantially lower prices, and especially when the various producers are underselling one another and have set up a whole range of prices with one cent variations.

Cost of Production

There has been a great deal of conjecture on the part of the public in general and consumers in particular as to the cost of production of rayon yarn. The consumers generally have not been in a position to form any ideas as to such costs and naturally are wondering, since many of them by experience have witnessed prices from $5.00 per lb. to the present low levels, exactly what the end will be and what margin there is still left for the producer. The average consumer feels that there is still room for considerable reduction in prices as he is erroneously under the impression, through no fault of his own, that manufacturing costs of 150 denier rayon yarn are in the neighborhood of 50c. per lb.

While production costs are well guarded in all plants and very seldom is the aggregate known to more than those who comprise the top officials, it is, nevertheless, a subject that the average business man or the average technician can analyze and arrive at a result that will be fairly accurate.

There are three fundamentals that enter into the cost of producing a pound of yarn, namely: (1) cost of raw material; (2) cost of labor; (3) cost of overhead.

Inasmuch as viscose rayon is produced by more or less a fixed formula, it would be unreasonable for anyone to suppose that there can be any wide variation in this figure.

The cost of labor is directly dependent upon the efficiency of the operation and the prevailing labor rate in the territory in which the yarn is manufactured. However, there is some variation in methods of procedure in plants and some difference in plant layouts which will enter into, in a small way, the labor figure. However, this should not result in more than from 5 to 8% of the total labor cost per pound, and in many instances rearrangements and corrections to layout can be made in such a manner that all plants, regardless of size, should be on an even footing with regards to pounds produced per day per operative employed.

In referring to overhead chargeable to the cost of production per pound, various manufacturers set up their cost figures in various ways. For simplicity's sake, let us not take into consideration under this heading at this time invested capital. Under overhead should be considered such items as administrative and sales expense together with normal taxes but not including Federal income taxes. It can be readily seen that the sales and administrative expense would depend entirely upon whether the program of selling is an expensive one or whether selling is accomplished along economic lines.

There are of course other variables that enter into the cost per pound such as heat, light, power and water and general supplies for repair and maintenance. The repair and maintenance supplies is an item that should not vary in any degree in various plants if they have been carefully and economically operated. The cost of steam and power may vary in narrow limits.

There Must Be a Bottom

It is of course not the object of this statement to go in any definite way into the cost of production but merely to point out and to specifically call attention to the fact that in the manufacture of rayon, as in anything else, there must be a bottom. The industry will not permit many more price cuts without disaster.

Undoubtedly certain of the smaller producers are at the present moment operating at a loss and even some of the larger producers can certainly not be happy over the present situation. It must be borne in mind that the rayon industry is one that requires special knowledge and involves a great deal of research, both chemical and engineering, and that the present high standard of quality has only been brought about by tremendous investment and large research expenditures. It is necessary for the producers to maintain expensive research and laboratory facilities and they must constantly be prepared for changes in equipment to keep pace with the ever-increasing demand for a better product.

The manufacture of rayon has other hazards and difficulties not attendant on other processes. Being a chemical fiber, there arise at times conditions which at the moment cannot be controlled and which may result in spoilage of yarn in process or in the production of inferior yarns not possessing the requirements of the trade—which yarns are naturally not suitable to be sold at standard prices, and in many cases, through no intent by the manufacturer, are sold as standard yarns and later revert back to the producer in the form of damage claims.

WORLD DIRECTORY of Rayon Producers

Company and Plant Location (Headquarters office in parenthesis)	*Process*	*Capacity in Tons per Day*
AUSTRIA		
Erste Oesterreichische Glanzstoff-Fabrik A. G., St. Polten, closed on July 1 for two or three months	Viscose	6
BELGIUM		
Soc. Anversoise de Soie Artificielle S. A., Antwerp	Viscose	1½
Soc. Anon. des Soieries de Maransart (Brussels), Couture-St. Germain	Viscose	2½
Soieries de Ninove S. A. (Brussels), Ninove. Just recently started	Viscose	..
Les Fabriques de Soie Artificielle d'Obourg, S. A., Obourg-lez-Mons	Viscose and Nitro	5 2½
La Seta (Fabrique de Soie Artificielle) S. A. (Brussels), Ecaussines	Viscose	1½
Soc. Gen. de Soie Artificielle par le procede Viscose S. A. (Brussels), Alost	Viscose	5
Fabrique de Soie Artificielle de Tubize (Brussels), Tubize	Viscose and Acetate	5 4
BRAZIL		
Visco-Seda Matarazzo Limitada, S. Caetano	Viscose	1¼
BRITAIN		
Alliance Artificial Silk, Ltd., Lowestoft, Only working on small scale	Acetate	Unknown
Apex (British), Artificial Silk, Ltd., London. Temporarily closed	Acetate	⅓
Artificial Filaments Syndicate, Ltd. (Liverpool), Runcorn. In voluntary liquidation	Viscose	..
Atlas Artificial Silk Processes, Ltd., Littleborough	Viscose	1
Branston Artificial Silk Co., Ltd., Burton-on-Trent	Viscose	4
Breda Visada, Ltd., Littleborough	Viscose	2¼
British Acetate Silk Corp., Ltd., Stowmarket. Temporarily closed	Viscose	3 to 4
British Bemberg, Ltd. (London), Doncaster. Commencing in December, 1930	Cupra	To be 4
British Celanese, Ltd., (London), Spondon	Acetate	Unknown
British Enka Artificial Silk Co., Ltd., Aintree	Viscose	7½
British-Netherlands Artificial Silk Co., Ltd., Wigton. Not yet commenced	Viscose	2
Brysilka, Ltd., Apperley Bridge	Cupra	2½
Cellulose Acetate Silk Co., Ltd., Lancaster	Acetate	2
Courtaulds, Ltd., (London), Coventry, Wolverhampton and Flint	Viscose and Acetate	Unknown
Harben's (Viscose Silk Manufacturers), Ltd., (Manchester), Goldborne	Viscose	5
Kemil, Ltd., (Manchester), Peterborough	Viscose	2
Kirklees, Ltd., Bury	Viscose	2
Linium Products Syndicate, Ltd., Nottingham	Cupra	Small
Nelsons Silks, Ltd., Lancaster	Acetate	Small
North British Artificial Silk Co., Ltd., (London), Jedburg	Viscose	2
Nuera Artificial Silk Co., Ltd., St. Helens. In voluntary liquidation	Viscose	..
Rayon Mfg. Co., Ltd., Leatherhead	Viscose	2
Scottish Artificial Silks, Ltd., Tongland. Temporarily closed	Viscose	½
CANADA		
Canadian Celanese, Ltd., Drummondville, Quebec	Acetate	Not given
Courtaulds (Canada), Ltd., Cornwall, Ont.	Viscose	5⅓
CZECHOSLOVAKIA		
Artificial Silk Works, Ltd., (Senica), Bratislava	Viscose	1½
First Bohemian Artificial Silk Co. (Prague), Thereisenthal	Viscose	2½
Bohemian Glanzstoff Co., Lovosice	Viscose	4
FRANCE		
Soc. Albigeoise de la Viscose (Paris), Albi	Viscose	3
Soie Artificielle d'Alsace (Paris), Colmar	Viscose	2½
Soie Artificielle d'Amiens (Paris), Amiens	Nitro	¾
Soc. Ardechoise de la Viscose (Paris), Vals-les-Bains	Viscose	1½
La Soie d'Argenteuil, Argenteuil	Viscose	1½
La Soie de Besancon (Paris), Besancon	Viscose	2
La Soie de Calais, Calais	Viscose and Acetate	Unknown
Textiles Chimiques du Centre (Paris), Nevers	Viscose	1½
La Soie Charentaise (Paris), Rochefort S/Mer	Viscose	To be 2
La Soie de Clairoix, Clairoix	Acetate	1½
Soc. Francaise des Crins Artificiels (Paris), St. Just-des-Marais (Oise)	Viscose	1
Le Cuprotextile (Paris), Roanne	Cupra	1
Soc. d'Etudes et des Textiles Nouveaux, Ratigny. Future plans unknown	Viscose	..
La Soie de Feyzin, Feyzin	Viscose	1
Soc. Francaise de la Viscose (Paris), Arques-la-Bataille	Viscose	3
Soie Artificielle de Gauchy (Paris), Gauchy	Viscose	3
Soie Artificielle d'Izieux (Lyons), Izieux	Viscose	4
La Soie de Lille (Paris), St. Andre. Not known to have commenced	Nitro	..
Soc. Lyonnaise de Soie Artificielle (Lyons), Decines and St. Maurice de Beynost	Viscose	10
Textiles Synthetiques de Montlucon, Montlucon	Viscose	Small to be 1
Soc. Nationale de la Viscose (Paris), Grenoble	Viscose	6 to 8
Soie Artificielle de Neuville (St. Etienne), Neuville	Viscose	⅓
Textiles Chimiques du Nord et de l'Est (Paris), Odomez	Viscose	2½
Soc. Nouvelle de Soie Artificielle (Paris), St. Aubin-les-Elbeuf and Jouxte-Boullenc	Viscose	2
Rennes Artificial Silk Co., Ltd., Rennes. Understood to be closed	Nitro	½
La Soc. pour la Fabrication de la Soie Rhodiaseta (Paris), Lyons, Roussillon and Peage	Acetate	4
Soie Artificielle du Rhone, Neuville. Not known to have commenced	Viscose	..
La Setyle Francaise (Paris), Lamotte-Breuil. Not known to have commenced	Acetate	..
La Soie Artificielle (Paris), Givet	Viscose	3
La Soie de St. Chamond, St. Chamond	Viscose	1
Soieries de Strasbourg, Strasbourg	Viscose	2
Soie Artificielle du Sud-Est (Paris), Vaulx-en-Velin, and La Voultre S/Rhone	Viscose	3 to 4
Soc. Francaise des Textiles Neo-Soie et Neo-Laine (Lille), Irigny	Viscose	⅔
Soc. Francaise de Tubize (Lyons), Venissieux (Rhone), and Grand Quevilly (Seine Inferieure)	Acetate	3 to 4
La Soie de Valence (Paris), Valence and Avignon	Viscose	3
Soie de Valenciennes (Brussels), Valenciennes	Viscose	3
La Soie Vauban (Paris), Conde sur l'Escaut	Viscose	2½
La Viscamine, Pontcharra	Viscose	1 to 2

Company and Plant Location (Headquarters office in parenthesis)	Process	Capacity in Tons per Day
GERMANY		
Aceta G.m.b.H., Berlin	Acetate	3
J. P. Bemberg A. G., Barmen	Cupra	15
Borvisk Kunstseiden A. G., Herzberg. Temporarily closed	Viscose	1½
Deutsche Celta (Elberfeld), Petersdorf i. Rsgb. Temporarily closed	Viscose	Unknown
I. G. Farbenindustrie A. G. (Berlin), Wolfen, Premnitz, Bobingen and Dormagen	Viscose and Cupra	Unknown
Gebruder Friese A.G., Kirschau	Cupra	½
Glanzfaden, Petersdorf. Temporarily Closed	Viscose	2 to 4
Vereinigte Glanzstoff Fabriken A. G. (Elberfeld), Oberbruch, Obernberg and Kelsterbach	Viscose	Unknown
Glanzstoff-Courtaulds G.m.b.H (Elberfeld), Cologne	Viscose	Unknown
Neue Glanzstoffwerke A. G., Breslau	Viscose	4
Herminghaus G.m.b.H. (Elberfeld), Vohwinkel. Understood to be temporarily closed	Viscose	1½
Holkenseide G.m.b.H., Barmen. Understood to be temporarily closed	Cupra	2½
Stapelfaserfabrik Jordan Kommandit-gesellschaft, Sydowsaue	Viscose	5 to 6
Fr. Kuttner A. G. (Sehma i. Sa.), Sehma and Pirna	Viscose and Cupra	10 5
Leinbrock-Kupferseide G.m.b.H., Neustadt Not known to have commenced	Cupra	..
Mez Vater & Sohne, Freiburg	Viscose	½
Deutsche Acetat-Kunstseide Rhodiaseta, Freiburg	Acetate	2 to 3
Textilchemische Werke A. G., Hilden	Viscose	½
Spinnstoffwerk Glauchau A. G., Glauchau	Viscose	3
Spinnfaser A. G., Elsterberg	Viscose	5
Viskose A. G., Arnstadt. Understood to be temporarily closed	Viscose	1
Spinnstofffabrik Zehlendorf G.m.b.H., Berlin	Viscose	6½
GREECE		
Soc. Anon. de Soie Artificielle (Etma), Athens	Viscose	1
HOLLAND		
Dutch Artificial Silk Industry, Breda	Viscose	9 to 10
General Rayon Union (formerly Dutch Enka-Arnheim), Arnheim and Ede	Viscose	25
Dutch Nyma Co., Nijmegen	Viscose	6 to 7
Dutch Roosendaal, Roosendaal. Not known to have commenced	....	..
HUNGARY		
Magyarovarer Kunstseidefabrik A. G., Magyarovar	Nitro	1 to 2
ITALY		
Seta Bemberg S. A., Gozzana	Cupra	1½
Soie de Chatillon S. A., Chatillon, Ivrea and Vercelli. Acetate production being increased	Viscose and Acetate	28 ½
S. A. Italo Olandese Enka., Pizzighettone and Palestro	Viscose	6
S. A. Gerli Industria Rayon, Casano	Viscose	Unknown
Soc. Orsi Mangelli-Seta Artificiale Forli S. A. F., Forli	Viscose	3
Manifattura de Caluso, Caluso	Cupra	To be 1½
Manifattura Seta Artificiale, Casale-Monferrato	Viscose	4
Soc. "Rhodiaseta" Italiana, Pallanza	Acetate	To be 5
La Setyl Italiana, Milan	Acetate	Unknown
Snia Viscosa, Venaria Reale, Cesano Madderno, Abbadia, Pavia and Altessano	Viscose	60
S. A. Fibre Tessili Artificiale, Piacenza	Viscose	To be 4
Italian Tubize, Corsico. Plans unknown	Acetate	..
Seta Artificiale Varedo, Varedo-Magenta, Ceriano-Aquila, and Cismon	Viscose	10
Soc. Gen. della Viscosa, Rome, Padua, Rieti and Naples	Viscose	25

Company and Plant Location (Headquarters office in parenthesis)	Process	Capacity in Tons per Day
JAPAN		
Japan Bemberg Corp., Kurze. Not yet commenced	Cupra	..
Asahi Silk Weaving Co., Ltd., Zeze	Viscose	9
Japan Rayon Co., Ujicho, Kyoto Fu	Viscose	6
Miye Rayon Co.	Viscose	Small
Showa Rayon Co., Ltd., Katata-Cho	Viscose	6
Teikoku Jinzo-Kenshi Kaisha, Ltd., Yonezawa, Hiroshima and Yamagu chi-Ken	Viscose	18
Toyo Rayon Kaisha, Ltd., Ishiyama	Viscose	11
POLAND		
Soie Artificielle de Tomaszow, Tomaszow	Viscose	8
	Nitro	3
"Borvisk" Danzig-Polnische Kunstseiden, Danzig. Not yet commenced	Viscose	..
RUSSIA		
All-Russia Union of Artificial Silk Industries (Moscow). Small present production but vast schemes in hand under 5-year plan	....	..
SPAIN		
Seda de Barcelona, Barcelona	Viscose	4
Soc. Anon. de Fibras Artificiales, Blanes	Viscose	3
Soc. Española de Seda Artificiale, Valenoceda	Viscose	To be 5
SWEDEN		
Akt Svenskt Konstsilke, Boras	Viscose	1
SWITZERLAND		
Feldmuhle A. G., Rorschach	Viscose	2
Novaseta A. G., Arbon	Acetate	½ to 1
S. A. Viscose Rheinfelden-Suisse, Rheinfelden	Viscose	2
Rhodiaseta. Not yet commenced	Acetate	..
Steckborn Kunstseide A. G., Steckborn	Viscose	3
Swiss Viscose Co., Emmenbrucke	Viscose	10 to 12
Syntheta, Basle	Acetate	Small
Tessillia, Glarus	Acetate	Small
UNITED STATES		
Acme Rayon Corp., Cleveland, O	Viscose	1½
American Bemberg Corp. (New York), Elizabethton, Tenn	Cupra	7½
American Enka Corp. (New York), Asheville, N. C	Viscose	9
American Glanzstoff Corp. (New York), Elizabethton, Tenn	Viscose	13½
Amoskeag Mfg. Co., Manchester, N. H.	Viscose	Unknown
Belamose Corp., Rocky Hill, Conn	Viscose	2½
Carolina Rayon Mills, Burlington, N. C. Formerly A. M. Johnson Rayon Mills	Viscose	Unknown
Celanese Corp. (New York), Amcelle, Md.	Acetate	15
Delaware Rayon Co., New Castle, Del.	Viscose	3
Du Pont Rayon Co. (New York), Buffalo, N. Y., Old Hickory, Tenn., Richmond, Va., and Waynesboro, Va.	Viscose and Acetate	40
Furness Corp. (Philadelphia), Gloucester City, N. J. Not in full commercial operation	Cupra	Unknown
Hampton Co., East Hampton, Mass	Viscose	1½
Industrial Rayon Corp., Cleveland, O., and Covington, Va.	Viscose	18
New Bedford Rayon Co., New Bedford, Mass	Viscose	2½
Skenandoa Rayon Corp., Utica, N. Y.	Viscose	5
Tennessee-Eastman Corp., Kingsport, Tenn. In experimental operation	Acetate	Unknown
Tubize-Chatillon Corp. (New York), Hopewell, Va., and Rome, Ga	Nitro, Viscose and Acetate	22½
Viscose Co. (New York), Marcus Hook, Pa., Lewistown, Pa., Roanoke, Va., Parkersburg, W. Va., and Meadville, Pa	Viscose and Acetate	105
Woonsocket Rayon Co., Woonsocket, R. I.	Viscose	2½

The Week in Textiles

Flashes from World of Rayon . . .

BELGIAN RAYON prices have been cut 12% but it is believed only a temporary move occasioned by dumping on market by importers and new companies. . . . . German Glanzstoff is consolidating its position by obtaining closer control over subsidiaries and forming united sales organizations in Czechoslovakia and Austria. . . . . French rayon production is apparently not seriously reduced by recent textile strike, but consumption suffered and stock position is slightly the worse. . . . . British rayon production in August was 3,500,000 lb. against 5,020,000 lb. in July and 4,670,000 lb. in August of last year.

Begin Tariff Hearings . . .

EX-AMBASSADOR FLETCHER'S first public act as chairman of the Tariff Commission appears prophetic of a speeding up of the wheels of tariff. In his first press conference Mr. Fletcher announced the dates of public hearings on articles on which preliminary investigation had been made by the former commission. Among these items are wool felt hats, Nov. 14, and wool floor coverings, "n.s.p.f.," Nov. 18.

Style Cycles . . .

SUGGESTIONS ARE reaching Washington that a study be made of style cycles. The style element constitutes one of the great hazards of business in many lines. While the demand for such studies is coming largely from the textile industry, style changes affect marketing in a wide variety of commodities. . . . . Corsets of the armor type went out of style and now are coming back sans steel. Derby hats, after long years of popularity, for no visible reason lost their claim on consumer demand. New York now has returned to the derby for no discernible reason and the whole country is expected to follow suit. . . . . It is believed that there are fundamental laws underlying style changes that can be defined. With the assembly of all possible data having a bearing on style changes it is believed to be possible to attack more intelligently the waste factor involved.

The Business Outlook

"A mad week from start to finish, mad with alarms, plots and rumors, brought into play or used by professional bears as a final desperate resort to squeeze the last drop of profit out of the short side of financial and commodity markets. This sort of thing is usual in the last stage of deflation, when prices have discounted all possible further business decline and are beginning to respond to the forces of recovery . . . Industrial production, except in steel, is showing somewhat less than seasonal improvement. General trade has shown more than seasonal expansion in September. Our preliminary index of business activity for the week ended Sept. 20 has risen further from 84% of normal to 85.6%. Rate of improvement, however, is still too slow to warrant expectation of return to normal levels in the few remaining months of this year, without more vigorous Federal Reserve action and business leadership." —*The Business Week*

The Textile Outlook

A price advance on a staple cotton fabric, lately made, is hailed by many as marking the turn. This strengthening is the ½ c. rise in percales. It brings to a focus the growing resistance among mills on many lines to acceptance of present prices and may encourage further advances. Summer curtailment and the present move toward restricting night-work gives promise that production will not get out of hand as in the past . . . Wool goods mills have opened spring lines. Leading mills are quoting somewhat under the last opening but perhaps a shade over current market levels. Reception was rather indifferent . . . Demand for knit goods has eased off with distributors avoiding any accumulations. Grenadines in women's hosiery are preferred. A price cut in bathing suits has been made by one firm . . . Raw silk touched a new low this week at $2.50. Markets founded on this material were therefore hesitant. Weavers nevertheless seem confident.

Longest Cotton Row . . .

WHAT IS thought to be the longest row of cotton in the world is located on the farm of A. R. Northcutt, in Mitchell County, Texas. It measures 16 miles. . . . . Mr. Northcutt's land is terraced and the first row makes a series of circles around the hill, starting at the outside and going toward the center, until the rows get too close to turn. This cotton grower travels further in plowing his first row than he does in driving from his home to Colorado, the nearest town, 15 miles away.

Cotton and Miniature Golf . . .

ABOUT 1,500,000 yd. of cotton textile fabrics are in use on the miniature golf links throughout the country, according to an estimate made in connection

with nation-wide survey conducted by the New-Uses-for-Cotton Section of the Commerce Department's Textile Division to determine the demand for cotton created by this newest American business. . . . . The estimated total is based on returns from 15 key sections of the United States and on an estimated number of 25,000 courses throughout the country. Startling variations were found in the quantities used per course, ranging from 10 yards to more than 1,000 yards per course in the same city. . . . . Uses include tents, awnings, folding chairs, pennants, umbrellas, "illusion" scenery, driving games, and tarpaulins. Scenic effects are stressed, and it seems to be the consensus that miniature golf needs more atmosphere than that which exists above the average vacant lot,—that cotton textiles mean as much to the future of midget golf as they have to circuses in the past.

Silk Institute for Paterson? . . .

PUBLIC-SPIRITED citizens of Paterson, N. J., which houses an important part of the country's broad-silk industry, have united forces with silk weavers, dyers and finishers there, in a movement for the establishment of a Paterson Silk Institute. . . . . Aims of the proposed institute include: Making Paterson silk a standard for the United States; closer cooperation between divisions of the Paterson silk industry; closer cooperation between the mills and the financial and industrial interests and city government of Paterson; stimulation of research work and development of more efficient technical methods of operation. Paterson is said to have 787 silk firms, owned by 3,000 individuals and employing 25,000 persons at an average daily wage of $70,000.

Limitation on Night Work . . .

NIGHT WORK FOR women and minors will be wiped from the slate of the cotton manufacturing industry by March 1, 1931, according to unanimous recommendation of the board of directors of the Cotton-Textile Institute last Wednesday. . . . . The number of spindles represented personally by the 65 directors is 11,102,989, not to mention the spindleage of the body of the Institute membership who will doubtless agree with this constructive and humanitarian move.

Cotton Consumption Relatively Big . . .

WORLD CONSUMPTION of all cottons during the 1929-30 season, was 24,579,000 bales, according to the preliminary estimate of the New York Cotton Exchange Service, against 25,767,000 bales in 1928-29.

The Union at Danville

THE record of union activities in textile mills which led us to state that "while William Green himself could secure the cooperation of any thoughtful manufacturer, his lieutenants in the United Textile Workers of America have demonstrated their inability to do so" (TEXTILE WORLD, *Feb. 8, 1930, page 17*) has been amplified by one more experience: the basis on which a vote in favor of a strike has been announced at the Riverside & Dan River Cotton Mills, Danville, Va.

The charge against the management of that plant contains four major counts: (1) Employment of the so-called "stretch-out" or "labor extension" system; (2) the 10% wage reduction made effective last February; (3) alleged poor working conditions; (4) alleged discrimination against union workers.

Taking these in order:

(1) The purpose of the Danville "stretch-out" plan is the same as that of the plan put in force at the Pequot Mills of the Naumkeag Steam Cotton Co., Salem, Mass.—namely, to permit the operation of more machines per skilled operative, with resulting savings to the mill and increased pay to the individual operative. The difference, from the union standpoint, seems to be that in the Naumkeag case the union participated while in the Danville case it did not.

(2) At the time of the wage reduction, President H. R. Fitzgerald stated very clearly why it was necessary. We have gone on record against general wage cuts but have pointed out the exceptions in those cases where existing base rates are out of line with competitive levels.

(3) We happen to know a great deal about working conditions at Danville and can state unequivocally that the third charge is untrue. The Riverside & Dan River Cotton Mills' industrial relations program is one of the soundest and fairest we have encountered anywhere.

(4) We know nothing about the alleged discrimination against union workers. However, three out of the four charges we know to be unfair.

We stated at the beginning of this year that we would not condemn union activities merely because they were the pursuits of organized labor, but that we *would* condemn any union activity which was not based on fundamentally sound economics. We stated further that the development of more satisfactory profits and higher wages, the major objective of the textile industry today, was not a job for street-corner orators, but for level-headed students of economic history and of present-day trends. We condemned the psychology which has been the basis for most union activities among textile operatives—namely, the assumption that unionization in itself will bring relief to the industry and its wage earners. We condemned the type of personnel employed, by and large, in textile unions. (TEXTILE WORLD, *Jan. 11, 1930, page 34*).

The Danville experience confirms our belief, expressed previously in these columns, that the union had been making the Pequot Mills development—which incidentally we pointed out as a sound cooperative job—a "show case," a sort of "window dressing." There is no indication that the union is following the alternative thought, expressed by us at the same time, that instead, the union must use the Pequot case, and the caliber of the local representative, as a yardstick for future attempts to cooperate with employers. (TEXTILE WORLD, *June 21, 1930, page 33.*)

The only conclusion we can draw from this analysis—representing an attempt to be as fair to the union as to manufacturers—is that, if the United Textile Workers of America continues to pursue the psychology and technique employed in the Riverside & Danville case, that union will follow all other uneconomic institutions into oblivion.

Night Work for Women and Minors
Unanimously Tabooed by Institute Board

ELIMINATION of employment of women and minors at night moved one step nearer accomplishment this week when the board of directors of The Cotton-Textile Institute, meeting in New York on Wednesday, voted unanimously to recommend such action to the cotton mills of the country, to take effect as soon as possible and not later than March 1, 1931.

It is impossible to over-estimate significance of the fact that this recommendation of the board carries with it, at the outset, the support of one-third of the total spindleage of the country. The 45 directors who attended the meeting represented 7,551,842 spindles while the 20 directors who could not attend but who sent their affirmative votes in advance, represented 3,551,147 spindles—making a total of 11,102,989 spindles. There was no dissenting vote. Thus, without any canvass of the industry, there is not merely a recommendation but an actual endorsement on the part of a very substantial portion of the total equipment in the mills.

The recommendation calls for the elimination of the employment of women and minors under 18 years of age between the hours of 9 p.m. and 6 a.m. There was a very strong sentiment manifested in favor of making the period of discontinuance even longer than from 9 p.m. to 6 a.m.

It is doubtful if ever before in the history of the industry so representative a gathering of cotton mill executives has made a nation-wide recommendation of such far-reaching significance. The action taken today is in line with the resolution adopted less than two weeks ago by the executive committee of the Institute.

Many leading New England and southern mill executives present at today's conference expressed the opinion that this recommendation, when placed before the annual meeting of the Institute on Oct. 15, 1930, will meet with spontaneous support.

Further Endorsement from Leaders

Further statements from manufacturers endorsing the action of The Cotton-Textile Institute have been received by TEXTILE WORLD. Henry F. Lippitt, chairman of the board of Manville-Jenckes Co., Pawtucket, R. I., states:

"I think the proposed elimination of night work for women and minors is the most promising step yet taken toward the rehabilitation of the cotton textile industry."

C. E. Hutchison, president of the American Yarn & Processing Co., Mt. Holly, N. C. says:

"In my opinion, the elimination of night work for women and minors would undoubtedly be of inestimable benefit to the cotton textile industry for a number of years at least and until the manufacturers add sufficient spindles to bring the business again to the saturation point. I consider the main objection that could be raised to the elimination is the matter of how and by whom the many thousand night workers are to be cared for unless it is done in an orderly manner until these workers can be absorbed in other occupations. Therefore the human element must be considered as well as the economic, in working this matter out."

Donald Comer, president of the Avondale Mills, Birmingham, Ala., says:

"I think the greatest need of our industry today is stopping night work. The greatest service The Cotton-Textile Institute can render is to supply that leadership which will prevent by agreement the employment of women and minors on night shifts. I also hope shortening of the day shift will not be too long delayed. I should like to pay a tribute to the late A. T. Bradlee, of Boston, who was one of the first to recognize and to warn against the harm that would follow this economic and social wrong."

Tribute to A. T. Bradlee's Efforts

Mr. Comer's reference to Mr. Bradlee is a deserved tribute to the efforts of a man, now dead, who had the courage to point out the "liability" of uncontrolled night work at a time when this attitude was much less popular than it is today. In its Feb. 4, 1928, issue, TEXTILE WORLD published an article by Mr. Bradlee which had been written in 1925 but which had not previously appeared in print. Mr. Bradlee, in that article, confined himself to the economic phases of the question. He contrasted the position of the United States with that of all other countries of major production. He also pointed out the increase in night running which developed during the war and post-war periods. He estimated that machinery on double shift increased about 4,000,000 spindles between 1914 and 1924. His discussion indicated very clearly the fact, emphasized in connection with the new movement in the industry, that night running has been adopted widely as an emergency measure.

Mr. Bradlee stated that the constant threat of overproduction from night work was not a sectional problem. Furthermore, he stated:

"If we are producing too many goods for the demand it is to the advantage of every mill, every stockholder and every operative that overproduction should be stopped. Continuous, steady operation is necessary to the welfare of all three. There can be no question as to which is the more profitable and satisfactory condition for all three, between continuous full-day operation as contrasted with unsteady, intermittent and part-time day and night operation. Short-time is unprofitable to all; and the higher wages that must necessarily accompany intermittent or curtailed employment may far offset any advantages arising from the double shift."

In commenting editorially on the night work question, at the time of publication of Mr. Bradlee's article, TEXTILE WORLD stated:

"The cotton branch of the textile industry now has, in The Cotton-Textile Institute, a means of converting majority opinion into effective remedial action, and the leaders of that organization are well aware that one of their major problems, and one that must be solved before there can be a normal stabilization of production, is the developing of some legal method of controlling a productive capacity on staple yarns and cloths that is dangerously in excess of normal consuming capacity of the domestic and available foreign markets. Furthermore these leaders are conscious of the fact that the unrestricted night operation of plants, that is possible in most of the cotton manufacturing states, is the most menacing factor of excess productive capacity."

This prediction of the possibility of leadership in the night work question, on the part of the Institute, has been borne out by the developments of the last few weeks.

Georgia Mill Men Hold Fall Meeting

THE approval of temperature controls in slashing and an enthusiastic discussion of mechanical problems featured the fall meeting of the Textile Operating Executives of Georgia, which was held at the Georgia School of Technology, Atlanta, Ga., Sept. 19. Attendance at the meeting was not so large as usual because of inclement weather and uncertain road conditions.

F. K. Petrea Elected Chairman

Frank K. Petrea, superintendent, Swift Mfg. Co., Columbus, Ga., was elected general chairman of the organization for the ensuing year, it was announced following a meeting of the executive committee Thursday evening. E. H. Rogers, agent, Fulton Bag & Cotton Mills, Atlanta, Ga., was elected vice-general chairman, while R. W. Philip, of Atlanta, was re-elected secretary and treasurer.

A. E. Massey, general superintendent, Thomaston (Ga.) Cotton Mills, was named to succeed W. R. Holt, assistant superintendent, Muscogee Mfg. Co., Columbus, Ga., whose term of office had expired. George W. Murphy, superintendent, Columbus (Ga.) Mfg. Co., was elected to succeed Walter B. Dillard who resigned from the executive committee upon leaving the State. D. D. Towers, superintendent, Anchor Duck Mills, Rome, Ga., succeeds E. H. Rogers on the committee.

Frank E. Heymer, superintendent, Piedmont Cotton Mills, Egan, Ga., general chairman of the association, called the meeting to order. George S. Elliott, superintendent, Pacolet Mfg. Co., New Holland, Ga., took charge of the discussion on slashing.

Discussion of Slashing

Experiments with corn starch, according to John H. Howarth, assistant superintendent, Lanett Mill, West Point (Ga.) Mfg. Co., prove that size should be boiled about one hour and 15 minutes to obtain the best results. When the starch had been boiled as long as one hour and 45 minutes it began to thicken somewhat like a corn-starch pudding and might clog the pipes.

It is poor practice, in Mr. Howarth's opinion, to mix potato starch and corn starch. It was felt that potato starch, which becomes thinner after boiling for a considerable length of time, should be boiled only about 45 minutes for good results.

Boiling of starch from one hour and 15 minutes to one hour and 30 minutes gives the best results, it was stated by V. J. Thompson, superintendent, Manchester (Ga.) Cotton Mills. He had boiled some as much as two hours but found that more shedding occurred when this practice was followed.

Although several members estimated that it was necessary to have slasher rollers leaded but once a year, C. K. Cobb, assistant superintendent, Canton (Ga.) Cotton Mills, felt that it should be done about every six months. He uses a 16 oz. blanket, finding that a heavier blanket leaves a mark on the cloth and that a lighter one does not hold up for work where indigo dyes are used.

B. E. Willingham, overseer weaving, Fulton Bag & Cotton Mills, Atlanta, Ga., stated that he found it advisable to remove the blankets every two weeks and inspect the rolls. He uses three yards of new blanket and about two yards of the old one and trims the blankets as they wear. It was found that shorter blankets tend to harden while a longer one provided too much cushion and the yarn was too heavily sized.

Experiments with changing the weight of squeeze rollers on size boxes from 350 lb. to 590 lb., both front and back, according to a report by Cliff Barnes, overseer weaving, Exposition Cotton Mills, Atlanta, Ga., resulted in less shedding and at the same time made it possible to dry the yarn with less steam.

By changing the weight of roller next to cylinder from 350 lb. to 450 lb., Mr. Heymer found that the size was forced into the yarn considerably better and that 1½ to 2% more size was applied. D. Singleton Cook, agent, Pepperell Mfg. Co., Opelika, Ala., also was able to increase the amount of size applied by about 2% after changing squeeze rollers from 250 lb. to 450 lb.

Since the installation of complete automatic temperature controls on his slashers, Mr. Thompson found that much more uniform sizing is obtained. Whereas with the old hand control method there would be a variation of from 4 to 5%, with the temperature controls this variation was reduced to not more than 2%. In changing sets where there is a great difference in the number of ends on the warps, it was found more satisfactory to maintain a constant temperature on the cylinder and vary the speed according to the number of ends.

One of the chief benefits of temperature controls, in the opinion of D. D. McAllister, overseer weaving, Chicopee Mfg. Corp., Gainesville, Ga., is that they provide an accurate method of determining the temperature on kettles. He emphasized the importance of knowing the temperature of size when it is being used. Mr. McAlister uses full controls on all slashers from cooking kettles to size boxes and does not find a variation of more than 2%. Although he runs no yarn heavier than 40s, the system operates equally successfully on all kinds of warps, it being necessary only to run the slashers slower on heavier sets with temperature constant.

It was felt that temperature controls are more important on the size box than anywhere else. Next they were said to be more desirable on the size kettles and, if it were absolutely necessary to omit them anywhere, several members would prefer to leave them off the cylinders.

Frank H. Cooper, assistant superintendent, Fulton Bag & Cotton Mills, of Atlanta, reported that a test made on 7½s yarn used for osnaburgs, warps of 1,224 ends, showed a net gain of 1.246% on 10,000 yards as a result of stretch on the slashers. This test was made on three cylinders which were ball bearing and yarn driven. The gain on 20s yarn, as reported by another member, was found to be 0.37% on a slasher with two cylinders, positively driven. The amount of stretch was found to be 2.27% on 22s yarn with cylinders yarn driven.

Weaving Problems

What is a correct method of loom inspection? This was the first question for discussion in the session devoted to weaving, under direction of Frank K. Petrea, superintendent, Swift Mfg. Co., Columbus, Ga.

H. L. Pruitt, overseer weaving, Lanett Mill, West Point (Ga.) Mfg. Co., described a satisfactory system

(Continued on page 174)

OVERSEERS' ROUND-TABLE

THIS department offers a new subject for discussion each week and gives readers' comments on problems introduced during previous weeks. The subject which was opened four weeks ago is closed this week and a summary of contributed ideas is given on opposite page

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Suggestion Boxes Are Discussed

Editor, Overseers' Round-Table:

BY ALL means there should be some arrangement, either a suggestion box or a notice to the same effect, whereby anyone who brings out something new, which benefits the concern, should receive a fair reward for his idea. I would suggest that a reward be given in the form of an annual payment, or bonus.

Should the new idea bring in additional profits per year, a fixed percentage—say 10% for the sake of argument—of the savings, or profits, should be paid. This would be an incentive to further effort.

I firmly believe in encouraging everyone, particularly young persons, who show promise of inventive ability, and a suggestion box is one way of doing this. In one instance, while I was with an English mill, I fixed a simple arrangement on a machine which doubled production. Weeks afterward I was told that the directors and heads had been to view the machine, but I was not there, nor did I receive any benefits. Had I received any encouragement in this particular case the firm which employed me would not have been the loser, and I am only one of hundreds of similar instances.

Any person who comes forward with a new idea should be encouraged by receiving some of the benefits.

HARRY RUSHTON.

The Overseers Discuss Their Meetings

Editor, Overseers' Round-Table:

THE QUESTION "do you think that meetings of the overseers are of real assistance" forces me to pick up my pen and immediately advise that I consider the Overseers' Round-Table one of the most interesting features of your magazine.

Whereas I enjoy, and learn considerable from, the human relations end of the discussion, I do feel that my technical textile knowledge is not so great but that I could increase it in no small measure. If I may offer a suggestion, I would like to place in consideration the idea of an employer-employee relations problem one week, and the next week a technical proposition.

Referring to the statement that the meetings are wasteful of time and merely a lot of hot air, I can only say that time spent in the pursuit of knowledge is not wasted. Benjamin Franklin said, "If a man empties his purse into his head, no man can take it away from him."

Let us continue the meetings. They are indeed worth while.

RAY E. BALLARD.
Ballard Silk Company.

Visiting Between Plants Is

"THESE are fast moving times," Superintendent Chase settled comfortably in his chair as the overseers' meeting came to order, "and all of us have to take advantage of every opportunity to learn things. I have been wondering if it would be a good plan to have you overseers visit some of the neighboring plants, in groups of two or three as your work would permit, and spend some time with the overseer of the department which corresponds to yours. You could look over machinery and discuss methods. This would also mean, of course, that you would occasionally be called upon to play host to overseers who might visit our plant. I think that it could be arranged with other supers all right, but I have been somewhat doubtful of the value of such visits, and anyway, it is a question which you should decide for yourselves."

"Come evening, and I like to visit some friend and sit around and chin for awhile," Bill spoke up, "but I don't think much of business visits such as you mention. In the first place, I don't think that they are necessary to keep up with the times. There is a great deal published and we see the overseers of other mills at various group meetings and have plenty of chance to talk over mutual problems with them at that time. This visiting around would take quite a bit of time away from our work and it seems to me that, even now, I have more ideas than I have time to put them in operation.

"In the second place," Bill continued, "even if we were unable to keep up with the times by the present means, I don't think that visiting would be of much assistance. Many overseers are reluctant to let outsiders see what they have done to improve efficiency and would spend most of the time showing the visitor routine stuff and would rush by anything really new so fast that you wouldn't know it was there. No, it might be a pleasant break to visit other plants, but I don't believe that the amount of information picked up would repay you for the time spent. And then

Is Considered

you can imagine how you'd feel to have a visitor announced on one of your busy days."

"I think that Bill is just naturally gloomy today," Pete responded, "and overlooks the good features of visiting. The old idea of having 'secrets' has pretty well gone by the board and I'm sure that you would find the average overseer willing to tell you absolutely everything he can, for he knows that with such an attitude he will receive as much, or more, information than he gives. Certainly visiting around offers the best method of having real concrete discussions, since the machinery and processes are right there at hand while you are talking. And speaking of machinery, I believe that visits are particularly valuable in determining the properties of new types of machinery. If you are considering a certain installation, talking with an overseer who is already running such equipment is a great help. Even if the other overseer hasn't an installation of the machinery in question he often has an opinion which will be worth listening to. I'm all in favor of a moderate amount of visiting between plants."

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Do *you* think that an overseer receives sufficient information by visiting other plants to justify the loss of time?

Overseers and others are invited to discuss this and other questions brought up in the super's talks. Letters accepted and published will be paid for without regard to length. Brevity is desirable.

Question of Punching the Time Clock

Editor, Overseers' Round-Table:

FROM MY experience and observation I am convinced that it would be to the interest of both management and employees for every one below the superintendent to punch the time clock.

This will convey to the mind of the employees the idea that the company is fair and impartial and has no desire to discriminate against anyone.

Punching the time clock will put the overseers on their toes and cause them to be on time, instead of rushing in the last minute, so as to be ahead of the superintendent, and then giving a dozen conflicting orders which nobody understands or has any desire to obey.

The men will have far more respect for the overseer and will do more, and better, work if they think they are working with him, than they will if they regard him as a kind of despot or monarch.

K. M. SMITH.

Editor, Overseers' Round-Table:

I AM decidedly in favor of overseers being exempted from clock punching; not on grounds of discipline, or even social inequality, but rather because of the firm belief that they have earned this privilege.

Do not let us overlook the important fact that an overseer's position is made possible only by preliminary study, hard work, and close application to his duties during his initiatory training. This accrued knowledge and experience surely places him on a higher plane and gives him a certain prestige which ought to exempt him from all petty regulations.

Concessions to departmental heads are a custom of long standing and I have yet to learn of one instance where objections have been raised by subordinates.

Immediately you place an overseer on the same footing as the workers, his authority is questioned, and a condition detrimental to the interests of all is created.

ROBERT A. C. SCOTT

Editor, Overseers' Round-Table:

OVERSEERS SHOULD be willing, at all times, to punch the time clock. Anyone who is on his toes wouldn't object as it only shows when an overseer is tardy or when he leaves the mill early.

Bill's idea that employees lose respect and discipline suffers is all bosh. I believe that the opposite is the case as the employees know that the overseer is right on the line waiting for the starter to say go.

In some mills where there is a second shift and the overseer is supposed to drop in occasionally he should also punch in, and out, at this time. Some overseers think that this is a spying system, but it should be remembered that we are supposed to put in a day's work, and any overseer who wants to forge ahead will not object to the time clock.

JAMES CARVEL.

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Summary of Discussion on Punching the Time Clock

In general, overseers opposed punching the time clock, 87% of the contributions voting against the plan. Of this 87% however, half, while opposing the time clock in general, believed that overseers should punch where management insisted upon installation of a clock. A militant minority of 13% came out flatly in favor of clock punching for overseers. No punching where the overseer was on salary, but use of the clock where the overseer was not on salary, was favored by 12% of the replies.

NEWS about MEN

GARNETT ANDREWS, president of the Richmond Hosiery Mills, Rossville, Ga., has been nominated vice-president for Georgia of the National Association of Manufacturers. The election of vice-presidents and other officers for the association will take place in New York on Oct. 6 at the regular annual meeting of the association.

WILLIAM M. BUTLER, president of Associated Textile Cos., controlling the Butler Mill, New Bedford Cotton Mills Corp. and Hoosac Cotton Mills won the Republican nomination for U. S. Senator from Massachusetts last week. Mr. Butler was former U. S. Senator and former chairman of the Republican National Committee.

MATTHEW P. WHITTALL, president and treasurer of the M. J. Whittall Associates, Ltd., Worcester, Mass., was toastmaster at a dinner tendered the Worcestershire (England) Sports Fellowship soccer eleven in Worcester on Sept. 20.

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T. J. YUND, president of Yund, Kennedy & Yund, Amsterdam, N. Y., has returned from an extended sojourn in Europe.

L. N. LITTAUER, president of the Gloversville (N. Y.) Knitting Co., has fully recovered from a recent siege of illness.

W. A. MCCANLESS, president and treasurer of the Halifax Cotton Mills, Inc., South Boston, Va., together with a party of friends, is spending his vacation on a fishing trip to Lake Prince, Va.

J. S. KEEFE, president, and other officials of the American Steel & Wire Co., made their semi-annual inspection of the works in the Worcester, Mass., district on Sept. 17 and 18.

THURMOND CHATHAM, president of the Chatham Mfg. Co., Winston-Salem, N. C., has been elected president of the North Carolina State Dairyman's Association.

DR. HOMER GAGE, president, JOHN F. TINSLEY, vice-president and general manager, and CHARLES M. THAYER and FRANK P. KNOWLES, directors, all of the Crompton & Knowles Loom Works; MATTHEW P. WHITTALL, president and treasurer and JAMES E. WHITIN, general manager, both of the M. J. Whittall Associates, Ltd.; EDWARD A. BIGELOW, treasurer and manager of the Hopeville Mills, FRANK H. WILLWARD, president of the Graton & Knight Co., GEORGE S. BARTON, president and treasurer of Rice, Barton & Fales, Inc., and THEODORE T. ELLIS, president and treasurer of the N. E. Fibre Blanket Co., all of Worcester, Mass., have been named members of the citizens' reception committee which will greet Gov. FRANK G. ALLEN of Massachusetts when he visits the New England Fair in Worcester on Sept. 25.

W. B. CHARLES, president of the W. B. Charles Co., woolens, Amsterdam, N. Y., has been selected as a delegate from Montgomery County to the coming Republican State Convention.

B. H. BRISTOW DRAPER, president of the Draper Corp., Hopedale, Mass., and MRS. DRAPER, were guests of NATHANIEL F. AYER, president of the Farwell Bleachery, Lawrence, Mass., on board his yacht, "Priscilla," for the yacht races off Newport, R. I., last week.

The following trade division heads have been named by the Federation for the

Garnett Andrews, who has been nominated for the office of vice-president for Georgia of the National Association of Manufacturers

Support of Jewish Philanthropic Societies, New York, in a drive to wipe out a deficit, necessary for fulfillment of the federation's obligations: Cotton Goods—LAWRENCE MARX, M. WILNER, H. C. OPPENHEIMER, SAUL F. DRIBBEN and I. M. FRIEDMAN. Knit Goods—DAN RHEINAUER and I. M. KASTNER. Silks and Ribbons—PHIL BASSER, W. ROBERT BLUM, ROBERT G. BLUMENTHAL, H. M. HUBSCHMAN, I. D. BACHMAN and JACOB GRANOWITZ. Woolens, Women's Wear—J. D. COHEN and NATHAN BLOOM. Woolens, Men's Wear—LOUIS RITTENBERG, LOUIS SURUT, S. HERBERT GOLDEN and HERMAN W. BLOCK.

BEVERIDGE C. DUNLOP, vice-president of John Dunlop's Sons, Inc., and American Glanzstoff Corp., since its formation, has been named vice-president of American Bemberg Corp.

W. R. REISINGER, vice-president of the Chalmers Knitting Co., Amsterdam, N. Y., has returned after spending the summer at Lake Pleasant, N. Y.

G. A. DORN, formerly vice-president of John K. Stewart & Sons, Amsterdam, N. Y., is now located at New Orleans, La., where he has entered another line of business.

JULES P. PETITMERMET has been elected a vice-president of the New England Spun Silk Corp., and RENE PFISTER treasurer thereof. Both officials have for many years been connected with the company in an executive capacity. Business necessities have required that IVAN A. STROHL, vice-president and general manager of the company, shortly depart for Europe for an indeterminate period, and although he will retain his office in the company, its affairs will be managed during his absence by Mr. Petitmermet and Mr. Pfister. ERNEST J. GNAEGI will continue to be in charge of the New York sales office as in the past.

H. S. ADAMS, secretary and treasurer of Eureka Cotton Mills and Springstein Mills, Chester, S. C., who has been in New York City, Haverhill, Mass., and Long Island, for two weeks, has returned to Chester. The trip was made by motor and he was accompanied by MRS. ADAMS and daughter, Marguerite.

F. J. HAYWOOD, secretary of Cannon Mills Co., has been renominated on the Democratic ticket for the State Senate from Cabarrus County, N. C.

EDWARD A. BIGELOW, treasurer and manager of the Hopeville Mills, Worcester, Mass., and MRS. BIGELOW, introduced their daughter, Katharine, to Worcester society on Sept. 20.

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RAY HOOVER, treasurer of Hoover Hosiery Mills, Concord, N. C., has been nominated by the Democrats for sheriff of Cabarrus County, N. C.

ARTHUR D. WINDLE, treasurer of the A. D. Windle Co., Millbury, Mass., received the unanimous nomination for Republican representative to the State Legislature from the Sixth Worcester district at the primary held on Sept. 16.

CHARLES A. ROOT, treasurer of the Uxbridge (Mass.) Worsted Co., Inc., was host to a party of friends on his yacht, "Toorac," at the last international yacht race off Newport, R. I., on Sept. 18. Among his guests were STANLEY H. WHEELOCK, president and treasurer of the Stanley Woolen Co., Uxbridge, and MRS. WHEELOCK, CHARLES E. W. MATTHEWS, general superintendent of the Davis & Brown Woolen Co., Uxbridge, and ALBERT L. SPRAGUE, purchasing agent for the Uxbridge Worsted Co., Inc.

WARD THORON, of Boston, Mass., treasurer of the Merrimack Mills, Huntsville, Ala., has been visiting the mill for the last week.

WALTER E. SCHUSTER, treasurer of the Schuster Woolen Co., and the Hayward Woolen Co., both of East Douglas, Mass., has been elected a delegate to the Repub-

lican state convention to be held in Boston on Sept. 27. Mr. Schuster was renominated without opposition for the governor's executive council at the state primary on Sept. 16.

HENRY M. CLEVELAND, son of the late JOHN B. CLEVELAND, well known financier and mill executive, has been elected president of the American National Bank of Spartanburg, succeeding WM. L. ISOM, who is no longer identified with that institution. MR. CLEVELAND is director in the Central National Bank, secretary of the Arkwright Mills, and former general manager of the Tucapau (S. C.) Mills and the Loray Division in Gastonia, N. C.

J. MCLEAN, of the Cone Export & Commission Co., New York, has been visiting and inspecting the Proximity Print Works, Greensboro, N. C.

THOMAS H. BALL, Philadelphia, and his family have returned to their home after having spent the vacation period at their summer residence on Martha's Vineyard, Massachusetts.

FULTON FARRELL, Fey, Farrell & Co., Philadelphia, Pa., was married Sept. 24. He and his bride plan to sail Sept. 26 for the West Coast of South America, where he will represent his concern.

SAMUEL COURTAULD, chairman of Courtaulds, Ltd., British silk and rayon manufacturers, who has been visiting his firm's branch in Cornwall, Ontario, recently sailed for New York where he will pay a visit before returning to England.

E. P. COFIELD has arrived at Charlotte, N. C., from Anderson, S. C., and has entered upon his new duties as representative of styling and merchandising of products of the Gossett chain of mills and the Chadwick-Hoskins Mills. Mr. Cofield has been general superintendent of the chain of Gossett Mills. W. C. BOBO, with the rayon department of the Gossett Mills, has succeeded Mr. Cofield and will continue his other duties in the rayon departments of these plants.

ROSCIUS C. NEWELL, former agent of the Palmer mill of the Otis Co., Three Rivers, Mass., and MRS. NEWELL, were married 60 years ago on Sept. 20, but the event was not celebrated on account of the poor health of Mrs. Newell.

GEORGE E. LEIGHTON, agent for the Barre Wool Combing Co., Ltd., South Barre, Mass., entertained the Worcestershire (England) soccer eleven at his home, Barnby house, in that village on Sept. 19.

JOHN F. REARDON, agent for the Grosvenor-Dale Co., North Grosvenor Dale, Conn., and family, have returned from their summer home at Crescent Beach, Conn.

W. F. HALL, JR., has assumed his new duties with George B. Pfingst, Inc., of Philadelphia, and he will have as sales territory the entire South. Mr. Hall had been connected with the Statesville (N. C.) Knitting Mills, and prior to becoming connected with this company was associated with the Charlotte (N. C.) Knitting Co.

H. Y. MCNEIL, general manager of the Fonda (N. Y.) Glove Lining Co., has been named head of a committee in charge of a finance campaign for the Boy Scouts in Fulton County.

C. S. TATUM, general manager of the Pilot Division of the Consolidated Textile Corp., Raleigh, N. C., recently entertained his overseers at a barbecue dinner.

G. S. ELLIOTT is the superintendent of the Pacolet Mfg. Co., New Holland, Ga., and any reports to the contrary are untrue, according to a published statement.

M. R. HARDEN, for some time superintendent of the Delgado Mills, Wilmington, N. C., has tendered his resignation, effective Oct. 1.

WALTER B. DILLARD, JR., has resigned the superintendency of the Peerless Cotton Mills, Thomaston, Ga., to accept a similar position with the Riverdale Cotton Mills, Enoree, S. C.

ROBERT WOOD, formerly superintendent of the Wampum Cotton Mills, Inc., of Lincolnton, N. C., has been appointed overseer of spinning at the Gray Mfg. Co., Gastonia, N. C., succeeding J. H. FAGAN, who has resigned to represent the Gastonia Brush Co., and the Gastonia Roller Spindle & Flyer Shops, of Gastonia, throughout the entire southern states.

William M. Butler, who is Republican nominee for U. S. Senator from Massachusetts

H. A. BARNES, superintendent of the Proximity Print Works, and F. J. BLACKWOOD, assistant secretary of the Revolution Cotton Mills, Greensboro, N. C., have been elected second and third vice-president, respectively, of the Cone Memorial Y. M. C. A.

E. W. DUNMORE, superintendent of the Utica (N. Y.) Knitting Co., has been appointed a member of the industrial relations department of the Y. M. C. A. in that city.

A. W. EDWARDS has recently assumed his new duties as superintendent of the testing laboratory of the Morgan Cotton Mills, Laurel Hills, N. C.

Obituary

John L. Burton

John L. Burton, who for 20 years was agent of the Nashawena Mills, New Bedford, Mass., died Sept. 21 in New Bedford from heart disease.

Mr. Burton was 72, having been born in Pollockshaws, Renfrewshire, Scotland, June 15, 1858, the son of Henry and Jessie Lockhart Burton. He came to this country in 1879 and for eighteen years worked in the weave rooms at the Pacific Mills, Lawrence, and the Lyman Mills, Holyoke. He subsequently joined the Draper Corp., Hopedale, Mass., as weaving expert, taking charge of automatic loom installation, and later was agent for the Newmarket (N. H.) Mills and the Bristol Mills, New Bedford, Mass. Finally he was appointed agent of the Nashawena Mills, superintending construction and equipment of the large new enterprise launched by the late William Whitman. During the World War he originated an airplane fabric that was successfully used by the Government.

Mr. Burton was a past president of the Southern New England Cotton Manufacturers' Association, a director of the National Cotton Manufacturers' Association, trustee of the New Bedford Board of Commerce and the New Bedford Textile School, and a member of the Wamsutta Club and the old Dartmouth Club. He is survived by his widow, one son and two daughters.

Harry Allen

Harry Allen, for many years active in New England Mills, died recently in New Bedford, Mass. He was 66 years old, and was born in England. He came to this country 42 years ago as a representative of Thomas Hetherington & Sons, setting up machinery in many parts of New England. In 1906 he joined the Wamsutta Mills as boss carder, and in 1909 was made superintendent. Later he went to the Sharp Manufacturing Corp. as overseer of carding, and was assistant superintendent of the plant at the time that it was liquidated. His widow, one daughter, a brother and a sister survive.

Lafayette Lanier

Lafayette Lanier, agent of the West Point (Ga.) Manufacturing Company, of which his brother, George H. Lanier, is president, died recently at the age of 47 in Langdale, Ala., following two major operations in 24 hours. Mr. Lanier was also president of the Wehatchee Yarn Mills, Rock Mills, Ala., a director of the Citizens Bank and Trust Co., of West Point, and a director of the Chattahoochee Valley R.R. His widow, five sons, and two daughters survive.

Jesse W. Weinberg

Jesse W. Weinberg, treasurer and buyer for the Lund Textile Co., Inc., Fisherville, Mass., was found dead in the garage in the rear of his home in Auburndale, Mass., on Sept. 14, a victim of accidental monoxide gas poisoning. An investigation disclosed that Mr. Weinberg had been working on his automobile with the garage doors closed.

Paul L. Brandt

Paul L. Brandt, president of the Lund Textile Co., Inc., Fisherville, Mass., with branch mill at Rock Hill, S. C., died in New York City, Sept. 14.

NEWS about MILLS

Cotton

Lincoln Mills of Alabama, Huntsville, Ala., have begun construction of the foundation for a building that is approximately of the same dimensions as unit No. 2, and a large force of men is engaged in the work. Col. Leonard Aitken, vice-president and general manager of the company states that he is not yet ready to make any definite announcement of the construction.

Alabama Mills Co., Fayette, Ala., has a new installation for spraying oil on the raw stock furnished by Borne Scrymser Co., New York.

Exposition Cotton Mills, Atlanta, Ga., recently placed a contract with the Saco Lowell Shops, for additional opening equipment, six one-process pickers, 80 deliveries of drawing, six slubbers, seven intermediate roving frames, and three slashers. The latter machines are equipped with Tycos temperature controls.

Eagle & Phenix Mills, Columbus, Ga., have been issued a permit for addition to their plant. It is not known if new machinery will be added.

Swift Spinning Mills, Columbus, Ga., recently placed a contract with the Saco-Lowell Shops for changing 20 spinning frames, 4,560 spindles, over to long draft system.

Georgia-Kincaid Mills, Griffin, Ga., have placed a contract with the Bahnson Co., Winston-Salem, N. C., for the installation of additional humidifiers in their winder and warper rooms.

*__Union Cotton Mfg. Co.,__ Fall River, Mass., has sold its equipment to William B. Russell, Inc., of Fall River, dealer in textile machinery. The machinery includes approximately 800 automatic looms. The plant is shut down and liquidation proceedings are being carried out as fast as possible.

Nashua Mfg. Co., Lowell, Mass. Approximately 400 of the 600 employees of the plant are idle this week. Officials of the plant announced that two-thirds of the mill will not be in operation, but hope to re-employ the entire 400 operatives on Sept. 29.

Amoskeag Mfg. Co., Manchester, N. H., has resumed operations at its Jefferson mill, closed for a number of weeks past.

Er'anger Cotton Mills Co., Lexington, N. C., is installing 21 new spinning frames, which will increase production of the plant when placed in operation.

Gagner Mfg. Co., Statesville, N. C., will sell all machinery at its plant. The equipment includes eight 2,600-hook fine-index jacquards; 12 72-inch pick and pick 4x4 looms; 24 66-inch 4x1 looms with Gem heads, and 20 1,200-hook coarse-index jacquards. The mill is listed as having 206 jacquards. It will be recalled that Henry Gagner, who was head of the company, was recently killed in an accident.

Rodman Heath Cotton Mill, Waxhaw, N. C., has resumed operations following several weeks of curtailment.

Lorraine Mfg. Co., Pawtucket, R. I., is operating on a full-time basis, with night working shift, and will hold to this schedule for an indefinite period.

Ninety-Six (S. C.) Cotton Mill is now operating on a three-day per week schedule.

Winnsboro (S. C.) Mills have awarded contract to Fiske-Carter Construction Co., of Spartanburg, for building the $40,000 community house. The plans and specifications for the building were prepared by the Spartanburg office of Lockwood Greene Engineers.

Wool

T. F. Mullen & Co., Inc., Stafford Springs, Conn., have purchased from **Fabyan Woolen Co.,** the lower mill, machinery, water power, etc., situated on River Sts. T. F. Mullen & Co., Inc., have occupied this plant under lease for the last year.

American Felt Co., City Mills, Mass., which has been shut down for three months, is to resume operations shortly. Employees of the carding department have already been ordered to report for duty. This is the first time this branch has ever been closed.

Earnsdale Worsted Co., Clinton, Mass. It is said that this plant which was recently sold will be utilized for the manufacture of dyestuffs. A new company is being organized to operate the plant and operations are expected to be under way before Nov. 15.

Botany Worsted Mills, Passaic, N. J., are running on a full production basis, giving employment to a night shift, and expect to hold to this schedule for some weeks to come.

Bigelow-Sanford Carpet Co., Amsterdam, N. Y., plans increased operations after running on curtailed schedules for some time.

Chatham Mfg. Co., Winston-Salem, N. C., wool and wool mixed blankets, will start immediately the enlargement of its main plant, through the construction of two additional stories. It is estimated that the work will cost between $10,000 and $12,000 and an additional sum will be expended for machinery.

Oregon City (Ore.) Mfg. Co., closed Sept. 9 for the remainder of the month. The garment factory at Portland remains in operation.

S. B. & B. W. Fleisher, Inc., Philadelphia, Pa. Machinery and equipment of this concern, formerly spinners of worsted yarns, is being sold piece-meal, under direction of the receivers. Other worsted yarn spinning concerns have been taking most of material so far sold.

Worsted Textile Co., Inc., Valley Falls, R. I., is running its yarn department on two and three shifts. The weaving department is running full days.

Keyser (W. Va.) Worsted Mill, which plant has been steadily increasing operations since July, is getting well into capacity operations, according to an official announcement, and it is believed that the plant will soon reach capacity. A large number of the old employees have returned to their work at the plant and others have been employed as they are needed. Stuart Eddington of Boston, Mass., one of the owners of the Keyser Worsted Mill, accompanied by William Culpon, an experienced man in wool manufacturing, have been at the plant for some weeks looking into the increased production. F. E. Miller is superintendent of the company.

John Moore Worsted Mill, transported complete from England and established in Victoria (B. C.), Can., about a year ago, is expected considerably to extend its operations as the result of the recent Canadian Government tariff changes. The duty of 12½% on manufactured worsteds that applied at the time the mill was established was reduced a few months later, when the output of the plant was reduced to one-fifth of its capacity.

Knit

Hinsdale Trading Corp., a new concern chartered under Massachusetts laws, has purchased from the Strong-Hewat Co., of North Adams, Mass., the woolen mill property operated until recently by the last-named concern. Manufacture of mittens, stockings, cravats and other knit goods is contemplated. Robert H. Libby and John W. Adams, both of Boston, are president and treasurer, respectively. The capital stock consists of 1,000 common shares of no par value.

E. L. Greene Knitting Mills, Inc., Bath, N. Y., have filed certificates in the office of Secretary of State, increasing the amount of its capital stock from $100,000 to $150,000.

Broadalbin (N. Y.) Knitting Co. is now completing extensive improvements to its tenement property at that place.

Belmont (N. C.) Hosiery Mills, Inc., have ordered ten new H. H. Spiral knitting machines for the manufacture of 220-needle hosiery, which will increase the number of machines to 50.

Graham Hosiery Mills, Inc., Burlington, N. C., equipped with 70-latch needle knitting machines for the manufacture of fancy half hose, which closed down several months ago on account of a slow market and financial troubles, may start up again within the next ten days, it is said, as soon as reorganization plans can be definitely completed. A. B. Owens, hosiery manufacturer of Gibsonville, four miles north of Burlington, is interested in the new project, with J. E.

*Indicates previous mention of project.

Black, former president, secretary-treasurer and manager of the concern, it is understood.

*O'Brien Hosiery Mills Co., Winston-Salem, N. C., is advancing production following recent installation of additional equipment, giving employment to an increased working quota.

Nolde & Horst Co., Reading, Pa., has begun to operate its fine-gauged, full-fashioned hosiery machines on a 12-hour shift. **Traymore Hosiery Mills**, also in that city, are working some machines on Sunday, while two small mills at Temple, Pa., are also said to be running Sundays.

Lackawanna Mills, Scranton, Pa. The machinery and equipment of this firm, manufacturers of cotton and wool underwear, is being offered for sale to the trade by the Machinery Liquidating Corp., New York, acting as agent.

*Triumph Hosiery Mills, Inc., York, Pa., have begun construction of a new one-story addition, aggregating about 10,000 sq.ft. floor space, scheduled to be ready for service by the close of this year. The mill is working on a day and night schedule with full working force.

Blue Ridge Mills (Landrum, S. C.) properties, consisting of a damask mill, a hosiery mill and a number of operatives' dwellings which were sold at public auction at Landrum, Sept. 15, were purchased by L. G. Southard, attorney for John N. Cudd, for $6,300. The properties are estimated to have a value of around $30,000. The mills have not been in operation for a long time. The company was formerly capitalized at $150,000. Roland Lee was president and general manager, but following the failure of a Landrum bank several years ago, the plants were forced into bankruptcy. John N. Cudd was the largest creditor. Both mills are of brick construction. The knitting mill is equipped with 160 knitting machines and the damask mill with 32 looms.

Bear Brand Hosiery Co., Beaver Dam, Wis., has awarded contract for laying floors in new four-story mill addition, 85x99 ft., now under way, to C. F. Lyons, Fond du Lac, Wis., and this feature of work will be placed under way at once. The unit is scheduled for early completion.

Ripon (Wis.) Knitting Works, Inc., have taken bids on general contract for a new addition to be used for warehouse service, and expect to award work at an early date. Auler, Jensen & Brown, Oshkosh, Wis., are architects.

Silk

Penn State Silk Mills, Allentown, Pa., will sell office fixtures, looms and other machinery of the three plants on Sept. 25, as follows: Plant at Lumber & Chestnut Sts., 9 a.m.; 14th & Liberty Sts., 12:30 p.m., and South Albert & Lexington Sts., 2 p.m., all standard time.

R. & H. Simon Corp., Easton, Pa., has been chartered under Delaware laws by officials of the **Onondaga Silk Co., Inc.**, Ogdensburg, N. Y., including B. C. Milner, Jr., L. J. Zimmerman and Philip Vogelman, to take over and operate the mill of the **R. & H. Simon Co.**, at Easton, which has been inactive for a number of months. It is expected to begin production at once.

*Indicates previous mention of project.

Dan City Silk Mills, Inc., Danville, Va., according to official announcement, will immediately install additional machinery for a new line of work, which will afford employment to about 35 workers and increase the payroll to about $40,000 annually.

Rayon

American Enka Corp., Enka, N. C., is operating full-time, although full production has not yet been reached. Approximately 2,300 persons are working in this plant at present and more than 140,000 lb. of rayon is being produced weekly.

Du Pont Rayon Corp., Old Hickory, Tenn., has under construction the two final dwellings which are to be built by the Minter Homes Corp., on the property of the Du Pont company. These will be finished in October, and will bring to a close the 1930 building project of this company. Some of the old apartment houses are being torn down.

Finishing

Sturbridge (Mass.) Finishing Co., plans to operate 24 hours per day in the near future. This was the schedule previous to July since which time the plants have been operating only during the day.

Associated Dyeing & Printing Co., Paterson, N. J. John Milton and James A. Wiley, equity receivers for this company, have made application to the Federal Court for permission to sell at public auction the four local mills of the company at a minimum price of $1,750,000.

U. S. Rayon Corp., New York, N. Y. Two plants formerly operated by this company, are being offered for sale as complete units or piece-meal, by the Machinery Liquidating Corp., New York, acting as liquidating agent. The plants are a narrow fabric mill in Brooklyn, N. Y., and a rayon dyeing and converting plant at Belmar, N. J.

Marien Dyeing & Finishing Co., Inc., Brooklyn, N. Y., continues its expansion by opening textile printing and embossing departments, which are located in the new building, adjoining the present plant at 73 Richard St. The opening of these departments is in line with the firm's general program of expansion of a year ago, at which time it built a new boiler house. A feature of the work at the plant is the fireproofing of various textiles.

*Rockland Finishing Co., of Garnerville, N. Y., will ship five printing machines to the plant of the **Piedmont Print Works**, at Taylors, S. C. The remaining 15 printing machines will be shipped to the southern plant as soon as additional buildings have been built.

Firth & Foster Co., Philadelphia, Pa., specializing in finishing of woolens, worsteds and jersey cloth, has recently made a complete reorganization of the plant.

Renfrew Plant, Travellers Rest, S. C., is being converted into a finishing plant, as announced by A. W. Smith, president of **Brandon Corp.**, of which Renfrew is a part.

Textile Patents

ARTIFICIAL filament, Process of and apparatus for making. 1,773,969. Camille Dreyfus, New York, N. Y., and William Whitehead, Cumberland, Md. Assigned to the Celanese Corp. of America.

AUTOMATIC knitting machines, Pattern mechanism for. 1,774,408. Harry Swinglehurst, Orange, N. J. Assigned to Scott & Williams, Inc., N. Y.

BLEACHING textile fibers. 1,773,721. Henry P. Benson, Salem, Mass.

BRAIDING machines, Carrier for. 1,774,056. Charles Haggerty, Providence, R. I. Assigned to the New England Butt Co., Providence, R. I.

CARD-clothing foundation. 1,773,783. Herbert Midgley, Worcester, Mass.

COTTON picker. 1,775,890. James P. Cruise, Utica, Miss.

COTTON-picking machines, Draft bar for. 1,774,132. Jones P. Dagenhart, Gastonia, N. C.

FABRIC and method of making the same. 1,773,905. Harry Kirsner, U. S. Army, Philadelphia, Pa.

FABRIC - stretching machine. 1,773,232. Mathias Lenders, Aachen, Germany.

FINISHING cloth, Method of and apparatus for. 1,773,167. Wilhelm B. Bronander, Montclair, N. J.

GLACE fabrics, Manufacture of. 1,773,384. Felix Wolf, Vienna, Austria.

HEDDLE frames. 1,776,120. John Jacob Kaufmann, Elkins Park, and Louis Kasper, Philadelphia, Pa. Assigned to Steel Heddle Mfg. Co., Philadelphia, Pa.

JACQUARD - loom cylinder. 1,773,305. Charles A. Fisher, Kannapolis, N. C.

JACQUARD looms, Mechanism for. 1,773,528. Charles A. Fisher, and Cletus J. Ketner, Kannapolis, N. C.

KNITTING elastic fabrics. 1,775,033. Richard J. Wilkenson, Pawtucket, R. I. Assigned to Ribelastic Co., Needham Heights, Mass.

KNITTING machine. 1,775,032. Harvey D. Sampey, Telford, Pa. Assigned to Dexdale Hosiery Mills, Lansdale, Pa.

LATCH needle. 1,775,045. Joseph Messing, Philadelphia, Pa.

LOOM pickers, Machine for manufacturing. 1,773,345. Joseph H. Chadbourne, Danielson, Conn. Assigned to E. H. Jacobs Mfg. Co., Danielson, Conn.

LOOM temple, Intermittent thread-cutting. 1,775,034. Horace H. Burdett, Hopedale, Mass. Assigned to the Draper Corp., Hopedale, Mass.

LOOMS, Cloth temple for. 1,774,435. Norman G. Glattfelter, Drummondville, Quebec, Canada.

LOOMS, Jaw temple for. 1,776,230. Clare H. Draper, Hopedale, Mass. Assigned to the Draper Corp., Hopedale, Mass.

LOOMS, Shedding mechanism for. 1,776,102. John C. Brooks, Paterson, N. J.

LOOMS, Shuttle box for. 1,775,035. Clare H. Draper, Hopedale, Mass. Assigned to the Draper Corp., Hopedale, Mass.

LOOMS, Tension mechanism for. 1,774,147. Florian J. Mantel, Syracuse, N. Y.

LOOMS, Thread-cutting jaw temple for. 1,776,229. Horace H. Burdett, Hopedale, Mass. Assigned to the Draper Corp., Hopedale, Mass.

LOOP-positioning device. 1,774,397. Frank R. Page, Brooklyn, N. Y. Assigned to Scott & Williams, Inc., N. Y.

LOOMS, Warp stop motion for. 1,775,887. Thomas Albert Briggs Carver, Cheadle Hulme, England. Assigned to Carver Textile Patents, Ltd., Manchester, England.

LUG strap and method of making. 1,775,077. Washington Irving Bullard, Boston, Mass. Assigned to E. H. Jacobs Mfg. Co. Danielson, Conn.

PROCESS and means for supporting and stretching tubular fabrics during treatment. 1,775,894. Frederick Drabble, Matlock, England.

SPINNING and twisting machine. 1,774,666. Jose Serra Rabert, Barcelona, Spain.

SPOOL-dyeing yarns. Apparatus for use in. 1,775,922. William G. Abbott, Jr., Wilton, N. H.

TENTERING machines, Automatic stop-motion feeler for. 1,776,224. William Alford Hogan, Danville, Va.

VISCOSE products, Process of making high grade. 1,774,712. Alwin Jager, Chemnitz, Germany. Assigned to the firm Oscar Kohorn & Co., Chemnitz, Germany.

WOOL cleaning and scouring apparatus. 1,776,186. Harold Gilbertson Howell, Hastings, and Thomas Reginald Howell, Napier, New Zealand.

Questions and Answers

We undertake to answer, free of charge, to the best of our ability, questions pertaining to textile matters received from any regular subscriber to TEXTILE WORLD. We do not undertake, however, routine analysis of yarn or fabric, or investigation involving unusual expense.

Inquiries should give the fullest information and data possible. In the case of damage to material, a sample should be sent. All inquiries must be accompanied by the name of the person inquiring, not for publication, but as evidence of good faith. The identity of those seeking information on technical subjects will not be disclosed.

Letters expressing opinions or voicing criticism are cordially invited. These will be signed by the correspondent's name unless the letter itself contains a request that the name be withheld.—EDITOR.

Reed Width to Produce 40-in. Cotton Fabric

Technical Editor:

Can you give me an idea of how wide I should lay the enclosed piece of goods to get it off the loom 40 in.? The yarn is 18s single cotton warp and 10s single cotton filling spun soft twist. The writer had in mind 42 in., but is not sure whether that would be right or not. (7308)

There is no hard and fast rule governing the reed width to be given the warp yarn in order to produce a given width of cloth from the loom. So many factors enter into the weaving of all cloths, no matter what warp and filling yarns are used, that the solution to the problem narrows down to a matter of experience.

The tension of the warp, if excessive, will cause the warp ends to lie flat, and the filling will have to bend over or contract over the warp yarn. This bending causes a greater contraction of the filling and requires a greater spread of the warp yarn in the reed. If the warp is run with little tension, the filling will lie flatter in the cloth and the warp will have to do the greater bending or contraction. This condition will require less spread of the warp yarn in the reed.

The twist in the filling has a great influence on the amount the cloth will contract from reed width to cloth width. If the filling is soft spun, the warp yarn will have a tendency to bury itself in the filling, and the greater contraction will be in the filling. This condition would require a greater spread of yarn in the reed, because the filling would bend around the warp. If the filling were hard spun, the warp would meet with greater resistance and would have to bend around the filling. This condition would require less spread of warp yarn in the reed.

Most all loom reeds are figured on a basis of 6% contraction of the warp yarn from spread of yarn in reed to woven cloth. Analyzing the cloth in question, we find 32 ends of warp per inch. Then, 94% of 32 is 30.08 dents per inch in the reed to be used with the warp ends drawn one per dent. The total ends and dents in the warp and the reed, for a 40-in. cloth, would be 40 times 32, or 1,280 ends of warp drawn one per dent. This total, divided by the dents per inch in the reed (30.08), would be 44.55 in. spread of the yarn in the reed. We advise this spread to be used for the cloth in question on account of the soft-spun filling.

No matter how much spread is given the warp yarn in the reed, no two looms will give the same cloth width, because no two looms can be operated with exactly the same warp tension.

Calculating Amount of Yarn Required for Braided Fabrics

Technical Editor:

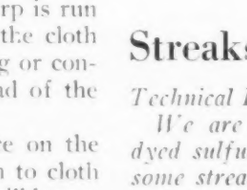
Is there not a rule for calculating the amount of yarn required for braided fabrics, the same as a woven fabric? I am assuming one has the number of picks, number of carriers, ends per carrier, and count of yarn. I have referred to several textile books, but find no information regarding the above. (7302)

The factor that is missing in the foregoing inquiry is the percentage of take-up in the yarn: without this, there has as yet been no rule devised for calculating the amount of yarn required for any given length of braided fabric.

If, however, the material is sold by the pound and costs are based on that unit, and the fabric consists of one count of yarn, no calculating will be necessary; each pound of braid will require one pound of yarn.

If the fabric consists of more than one kind of yarn, the amount of each kind required for one pound of braid may be determined by direct proportion. A small length of braid (6 in., for example) is measured and weighed carefully on a grain scale. Then the different yarns are extracted and weighed separately and the percentage of each determined.

Example: A 6-in. piece of braid, composed of two kinds of yarn, weighs 12 grains. Of the two different yarns, one weighs 8 grains, and the other weighs 4 grains. The proportions of the different kinds of yarn in the braid are, therefore, 67% (8 divided by 12) and 33% (4 divided by 12) respectively.



Streaks on Cotton Socks

Technical Editor:

We are enclosing one pair of 200-needle half-hose dyed sulfur black. You will note that these socks have some streaks that look as if they had wrinkles in them, and that they were not wet enough when boarded to remove the wrinkles. We have used dyestuffs made by two different companies, but have the same trouble with either color. We thought it possible that the wrinkles were caused in extracting the hose. Therefore we tried some without extracting them, but we had the same trouble. We also tried them both with and without olive-oil chip soap in the last rinse water.

We dye these goods in an open tub, turning them over with a pole and dyeing for 40 min. at a boil. The following formula is used for 100 lb. of goods: 7 lb. Sulfogen Carbon HXX, 7½ lb. sulfide chips, 2 lb. soda ash, 1 pint sulfonated

castor oil, and 15 lb. salt. After dyeing, we let them stand for 20 to 30 min. before rinsing. Next we put them in a washer and wash about four times. The same results are evident on both combed and carded yarns and also on mercerized yarns. Will you kindly advise us as to the cause of the streaks and the best way to eliminate them? (7287)

An inspection of the sulfur-black hosiery leads to the conclusion that the wrinkles are caused by the goods lying for too long a time in the dye bath without being poled. It is quite evident that poor circulation has caused these uneven places in the hosiery. The streaks are similar in appearance to wrinkles left in by the boarder but in reality are folds left too long undisturbed while lying piled up in the dyebath. More careful poling during the dyeing operation will remove most of these wrinkles.

We do not find anything wrong with the dyeing formula nor with the working method, except the 20 to 30 min. that the goods are left standing. If you will keep working the goods during this time (as well as while dyeing), instead of leaving them idle in the bath, we believe you will find your work greatly improved.

◆

Removing Spots from Blanket

Technical Editor:

We are today sending you one of our blankets on which appears a number of small spots. These do not appear to be grease spots. We have tried to remove them but cannot do it. Will you kindly suggest the cause and remedy for these spots? (7301)

While all of the spots have the same general appearance, we have been able to find two distinct varieties. This first was due to a dark thread, probably originally dyed with an alizarine dye. This had resisted being stripped to a light color, and then had escaped the picker and cards, and emerged as a tightly twisted thread embedded in the softer filling of the blanket. These dark threads also escaped the nappers; but being so much darker, they show through the nap and give the appearance of a grease spot.

We also found many spots which had originally been machine grease, but which had penetrated to the very center of the fabric. The fulling and washing had been able to remove only the surface stain, while the bulk of the stain remained imbedded in the goods. The nappers also had made the surface over these spots open enough for the dark stain to show through. Machine grease must be regarded as mineral oil which has become charged with quantities of finely divided metals—iron, brass, and babbitt metal being the most common. A solvent may dissolve the oil, but in many cases the metallic content affixes itself more firmly to the fibers, and can only be removed by actual abrasion. The fulling and washing operations can take care of the surface, but the deeper parts of the stain are more difficult to reach.

Since the grease stains must have gotten on the goods before fulling, we suggest an examination of each piece before fulling, when the examiner can dab on each spot some mixture of soluble oil with a good solvent. Then the fulling and washing will probably be able to take care of the oil spots.

The other class of spots, coming from the shoddy itself, depend on the grade of stock used, and can readily be eliminated.

THOUSANDS of inquiries are handled annually by the Technical Editors. In order that as many readers as possible may benefit from this service, we select problems of general interest for publication each week.

Polishing Heavy Cord

Technical Editor:

Will you kindly furnish us with a formula for polishing heavy cord, similar to the enclosed sample? Our machine is similar to by-water polishing machine. (7298)

The following polishing formula should give satisfactory results on heavy cord similar to the sample in question: 10 lb. potato starch, 2 lb. coconut oil; 1 lb. beeswax; 3 lb. gum arabic; 3 oz. borax. Mix the starch with cold water, stirring until lumps have disappeared; add water and bring to boil; stir in the gum and coconut oil; melt the beeswax and mix with the borax (previously dissolved in water); add to starch; make volume to 50 gal. before using. The cord has apparently been colored and finished in one operation. If this is the case, it will be necessary to strain a small amount of dyestuff dissolved in boiling water and add to the sizing solution. If it is necessary to lay the fibers more than is done with this sizing mixture, additional gum may be employed.

◆

Grenadine Hose Varies in Shade

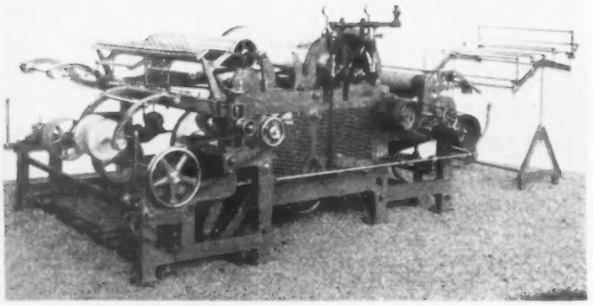
Technical Editor:

Enclosed you will find sample of a stocking knitted from three-thread grenadine silk, the silk being made from a Minorikawa. You will notice midway in the leg of the stocking a difference in the shade of the color, the lower portion being distinctly lighter than the upper portion. We are having considerable trouble with this condition and feel sure that it is not caused by dyeing, as it would seem impossible to bring this condition about in dyeing. Neither does it appear to be caused by a difference in the evenness of the silk. (7295)

Our first impression was that a different yarn had been used in the lower portion than in the part nearer the welt. With this idea in mind, we unfastened the seam at the point of change and found what we expected—a loose end, which, upon being drawn, went across the fabric. It proved that a new end of silk had been started at this point, causing the change of shade.

We then drew out another end of silk thread higher, or nearer the heel portion, and found upon comparing the twist that this end was not nearly so tightly twisted as the first end drawn. The amount of twist controls the luster, and any portion of fabric knitted from silk with a lesser or greater amount of twist than in the fabric just preceding it, will show a different degree of luster.

This is the trouble here, and not "shade," although the latter appears to be the cause.



Combination warper, beamer, and slasher for rayon ribbon warps

New Machinery a

Rayon-Ribbon Warper and Slasher

SIZING of rayon-ribbon warps is facilitated by a combination warper, beamer, and slasher developed recently by Van Vlaanderen Machine Co., Paterson, N. J. This machine obviates the skein sizing of ribbon warps and the consequent danger of breaking up of a good part of the sizing in the subsequent operations of winding, warping, and beaming. In addition—since slashing, warping, and beaming are done at the same time and at the speed required for ordinary slashing—the time usually spent in warping and beaming is saved.

The machine consists of a creel to hold from 100 to 1,000 spools, a lease stand which holds a cross reed, and an arrangement for the crossing rods. The sizing machine proper has size appliances consisting of two cylinders, a cooling roll, and a take-up to fit either beams or warp rolls. The beams are driven by a surface-friction drive. Therefore it is not necessary to run the beams exactly alike and they can be exchanged independently of each other. The machine can be equipped to run as many beams as are desired, a point which is controlled by the capacity of the creel.

The machine is equipped with a motor drive and variable-speed transmission; this gives the operator a wide range of speeds. It also has a stretch regulation which regulates the tension to which the yarn is subjected. A temperature-control device consists of individual valves and gages for the two cylinders. Owing to the small number of ends of which rayon warps usually consist, the steam consumption is small. The slasher has a starting and stopping device on all four corners, so that it only requires a step or two for the operator to start or stop the machine.

Some of the additional advantages claimed for this type of equipment are low labor cost resulting from the combination of three operations into one, and evenly sized warps which result in high-grade goods. It is stated also that where a certain finish has to be put into woven ribbon, this finish can be applied to the yarn during warp sizing and thus eliminate extra finishing after weaving.

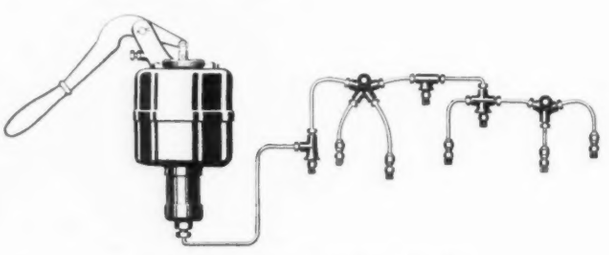
Central Lubrication of Industrial Machinery

A SYSTEM of central lubrication developed especially for industrial machinery has been announced recently by the Bijur Lubricating Corp., 250 West 54th St., New York. It is stated that this system has met with the approval of a number of manufacturers of textile machinery and it is expected that it will be adopted as standard equipment on several of the leading machines.

One of the features of central lubrication is that clean oil, in predetermined quantities, is supplied simultaneously to all bearings without stopping the machine. A single depression of a pump lever located at the operator's station suffices to lubricate every bearing on the machine. Because of this feature the safety factor is materially increased since the temptation for the operator to oil bearings while the machine is in motion is eliminated.

The Bijur system of industrial lubrication consists of an oil reservoir and pump to force oil through the system and a simple system of piping to distribute the oil under uniform pressure to control devices, called drip plugs, located at the bearings. Depression of the pump handle loads the cylinder with a predetermined quantity of oil, and release of the handle places this oil under a pressure of approximately 50 lb. per sq. in. As the lines are always maintained full of oil, flow begins immediately from each drip plug, irrespective of its distance from (or height in relation to) the reservoir. The drip plugs apportion the measured charge of oil delivered by the pump in accordance with their respective flow rates. Seven separate flow rates are provided to meet the lubrication requirement of various bearings.

The drip plug controls the flow of oil without the use of any moving parts. The control element is an annular restriction formed by an accurately drilled hole in which an accurately sized pin floats. The resistance of this annular restriction is many times greater than that of any other part of the system and, therefore, governs the rate of oil flow to the bearing. After metering through the drip plug, the oil enters the bearing under no pressure, over a period of time depending on the number and size of the drip plugs. This method of delivering oil permits the lubricant to build up a film on the bearing



System of central lubrication for industrial machinery

and Processes

surface and has no tendency to force the oil out of the bearing through the slack side.

Some of the advantages claimed for the Bijur system are as follows: Due to the method of governing the flow, the oil is fed to the bearing slowly over a period of time varying from two to five minutes, depending on the number and size of drip plugs used. Oil of any desired grade or viscosity may be used in the system, the heavier oils merely slowing down the rate of flow per minute through the drip plugs, but in no way influencing the total amount delivered. The system is thoroughly protected by means of an efficient felt filter. All oil entering the lines is forced through this filter, and lint or other foreign matter is caught on the surface of the filter and acts as additional filtering medium. Should the filter eventually become clogged, it is easily removed and cleaned or replaced.

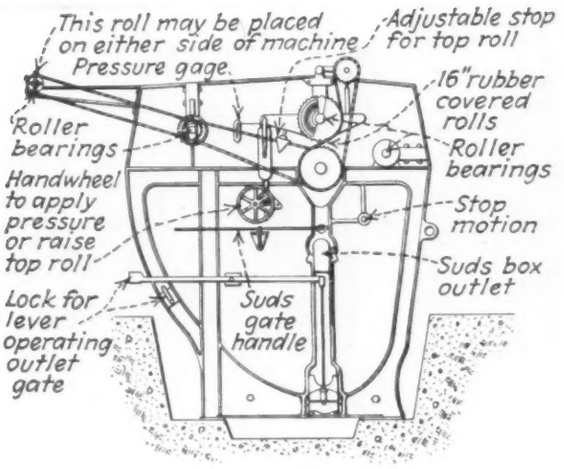
Metal-Clad Cloth Washer

DEVELOPMENT of an iron-clad, wood-lined cloth washer, designed to give faster and cleaner washing and lower maintenance costs, has been announced recently by James Hunter Machine Co., North Adams, Mass. Among the improvements incorporated in this new Model H washer are included silent-chain drive; automatic stop motion which, in case the goods become tangled, causes the machine to "knock-off," and thus prevents torn or damaged goods; large suds box with newly designed outlet gates which carry off the water much faster than with the older type of machine and thereby permit quicker and more thorough washing; and provision for making all operating adjustments while the machine is running.

The sides and quarters of the machine are cast solid and reinforced where greatest strain is liable to occur, with all joints machined at points of contact. Lining is of cypress—tongued and grooved. Troubles encountered with log rolls are avoided by equipping the machine with both top and bottom rolls of vulcanized rubber. The rolls run 120 to 150 r.p.m., as against 60 r.p.m. on the old-type wooden machines.

The top roll is carried in lever fulcrumed at one end, and pressure is applied at the other end by means of a coil spring. Pressure adjustment is accomplished by means of a handwheel located outside the machine and may be made while the washer is in motion. The rolls are equipped with an indicating pressure gage so that results may be easily duplicated.

Main drive is applied directly to the bottom-roll shaft through a disk friction clutch which eliminates counter-


This roll may be placed on either side of machine
Adjustable stop for top roll
Pressure gage
16" rubber covered rolls
Roller bearings
Roller bearings
Handwheel to apply pressure or raise top roll
Stop motion
Suds box outlet
Lock for lever operating outlet gate
Suds gate handle

Metal-clad cloth washer

stand and noisy gears and bearings. If preferred, drive can be applied through countershaft with roller chain and sprockets.

The roll-coupling drive consists of roller sprockets and silent-chain drive, thus doing away with the noise of the old-style, long-tooth gears. Sprockets have teeth cut to close limits and use of a carefully made chain makes a drive that is both smooth and quiet. This drive is said to be so flexible that no matter how far the top rolls are raised by the goods, the chain and sprocket cannot get out of mesh. The Model H washer is completely equipped with Alemite-Zerk lubrication fittings, and bearings are of heavy-duty roller type throughout. The machine is made in four-, six-, and eight-string capacities.

Wetting Out Agent

THE Dyestuffs Department of E. I. du Pont de Nemours & Co., Inc., Wilmington, Del., announces Alkanol, a wetting out and dispersing agent. In announcing this product, the company states that, due to its softening properties, it is of value throughout the textile industry for the following processes: Since it speeds up the boiling-out process, it is employed in kier boiling and as an assistant in removing natural impurities from cotton goods. It can also be used in the desizing bath, where it aids in the penetration of the fiber and thus shortens the time required for desizing. It is valuable in the sizing of cotton warps, as it aids in penetration of the size. Likewise, material wet out with Alkano bleaches more readily, because the bleaching liquors penetrate easily.

Alkanol is said to have a beneficial effect in a number of dyeing operations. It is of value for dissolving dyestuffs, as it wets out the color easily. When added to the dye bath, it aids the dye in penetrating the fiber and assists in securing level dyeings. It can be used in all types of dyeing from raw stock to piece goods, and is particularly valuable in securing penetration of the dye on hosiery. It is also used in the woolen industry for mixing with the oils in the preparation of the wool, thereby promoting more uniform absorption of the oil and improving the spinning properties of the wool.

Alkanol is a fine, light, cream-colored powder, readily soluble in water. In solution it is a practically colorless liquid that does not discolor vegetable fibers when applied in quantities to produce the most effective results.

DURENE

REG. U.S. PAT. OFF.

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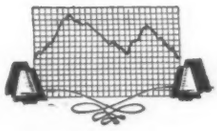
TEXTILE WORLD ANALYST



Trimmings Return with Feminine Styles

Trend in Men's Wear Is Toward Restraint; White and Oxford Grays Remain

Summary: **After a study of home and foreign style trends and indications in men's wear, it is seen that monotone colors for 1931 stand out as follows: Reefer flannel jackets in blues, gray blues, blue grays, and navies, a lot of 'em. Tans and browns will be worn with white flannel trousers, striped in jacket colors. Soft hats in subdued unfadable jacket tones complete the monotone ensemble. White soft pleated shirt bosoms will return, and white soft shirtings with white dobby dots will be distinctive for lounge shirts. Oxfords will stay in favor for strenuous sports.**

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This installment of the Analyst has been prepared especially for TEXTILE WORLD by Eugene Franklin Peirce, Color and Fabric Editor of the *Dry Goods Economist*. Once each quarter the Analyst appears in the form of a style forecast for fabrics. All other weekly issues will continue to consist of analysis and forecast of conditions in the textile industry, prepared as hitherto, by Dr. Lewis H. Haney, Director of New York University Business Research Bureau.

SHEER weaves in cottons, synthetics, silks, linens, nets, open weaves allied to laces, English eyelet embroideries and more especially leno weaves are to advance from the classification of novelties into the larger field of high-style favorites during the spring and summer seasons of next year. Dobby weaves will be revived. Fashion demands this, since femininity in many forms is to be accorded first place in the attire of girls and young matrons. Staples can take care of themselves.

Speaking from a standpoint of fashion, a well-ordered wardrobe calls for variety. In cottons, organdies will have more than usual attention. Evidence of this is presented in the action of a manufacturer of silks in Lyons, France, in developing for an American silk organization a new silk weave closely allied to an organdie construction and weight, with the crisp finish of an organdie. This fabric is a washable silk.

At the fair in Paris, several American manufacturers of novelty cotton dress goods were awarded prizes by an appreciative competing committee of French manufacturers qualified to judge creative talent from any source. Since fancy weaves are certain to be top liners in fabrics for the spring and summer seasons of next year, it seems clear that a renaissance of fancy cotton weaves will be put over by wide-awake converters. White will be outstanding.

TRIMMINGS TO RETURN

Trimmings, another entirely new fashion note, will gain in favor as the spring buying season advances. Decorations drawn from former periods in the history of dress and of costuming are one of the novelties in women's attire. Trimmings have been revived because plain colors are making a gain in all the avenues of women's attire, and to some extent will lessen the consumption of fancies.

Applique work is to be another form of decoration. It will be applied to both sheers and to opaque weaves. Velvet applique work is one example. White silk brocades floated on gauze weaves will be another. In a simpler form applique work will comprise cloth bands stitched on to plain weaves and made in the same color as the fabric, or in a lighter tone. Monotones of dark with light shades, or light tones with dark shades are basic examples of the monotone vogue certain to be outstanding in fashions for next year.

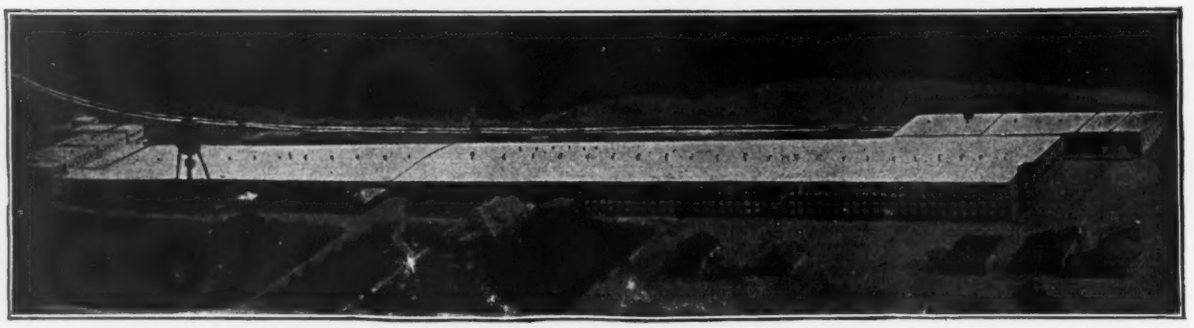
The broad scope of decorations will revive beads, spangles, sequins, gold, silver, and rhinestones in many forms—one of which will be necklaces. Embroidered motifs of rhinestones will be chosen as a decorative feature for black georgettes, and also will be given to decorate satin gowns for evening wear. Rhinestones will also appear in the form of "clips" to be used for the decoration of hats.

Cocktail jackets will be decorated with beads in assorted color range. Again beads will form bands, edgings, spaced motifs, pendants and so on. Black with white will be one outstanding combination. Monograms will be a minor decoration, mostly for blouses. Adaptations from brocades and applique will appear in volume.

More important than all of the foregoing will be jacquard effects. Double-warp georgettes will provide self-colored motifs since some of the warps will be cut out leaving a self-colored motif on a dyed ground.

Synthetics of sheer construction are to share in the building up of ruffled dresses. Handkerchief linens, too, will be favored. Not only will the foregoing be high style for dresses, but they will gain ground in the form of blouses which are certain to take a long step forward for summer wear, since jacket suits for "runabouts" will be in the fashion picture.

Coincident with a substantial renaissance of ruffled dresses there is a certain assurance of expansion in the use of embroideries since they have the endorsement of French dressmakers and appear to advantage in sheer summer



Spinning Mill, Lincolnton, N. C.

A BETTER STOCKING AT LESS COST

To meet the low prices that the hosiery manufacturers are getting for their hosiery today they are compelled to reduce their costs. Costs can be reduced by having less press-offs, less uneven plating and by increasing the speed of their machines. To meet these demands for better running yarn we are now making a FINE MULE SPUN SEA ISLAND YARN, which, owing to its greater elasticity and strength reduces press-offs to a minimum, giving a much more even plating, especially on high-speed machines. The very high lustre of this yarn will also increase the general appearance of the stocking.

Owing to the success our customers have had with this FINE COMBED SEA ISLAND YARN for picot edging, many of them are already using it with equal success for plating and reinforcing.

We can supply you with this yarn, which is not only fine as to quality, but in count also, in all numbers from 50/2 to 160/2 mercerized and from 160/2 to 200/2 in lisle.

This yarn can also be used for making fine lisle stockings.

Write today for samples.

BOGER & CRAWFORD

"From the Cotton Field Direct to You"

J and E. Venango Sts.
PHILADELPHIA, PA.

dresses. Grouped tucks and shirrings are also used.

Nevertheless, printed fabrics are to be retained for the spring and summer seasons of 1931. Abundant ground for this belief is given by the important fact that at the spring racing meets held in France every noted titled woman in the French Republic, princess, duchess, countess, marchioness, together with American women of fashion, appeared at the major meets costumed in chiffon, and printed principally in large designs. Small flowers were printed on crepes.

Printed Silks

Printed silks have been favored since the dawn of civilization, and are a fixture. Noted French landscape painters are now increasing their incomes by composing motifs for the use of printers of metals, silks, cotton dress goods, synthetics and so on. Thus art of a high order furthers the use of printed fabrics, but not to the exclusion of art in the form of decorations applied by power or hand.

Tailored suits must be added to the foregoing for practical use. They are now established in both New York and Paris in favor of the dressmakers. Naturally, suits require blouses which bid fair to continue their trend toward tunics, since adaptations from Grecian effects in dress are already established.

In tailored suits, dyed dress linens will retain a place. Producers of fine woolens in England for men's wear are introducing linens dyed in pastel colors. Such a movement should result in linens being retained for the spring season of next year.

Colors for Dress Fabrics

The major color series for next spring and summer will pivot on assorted shades of the following six series as top liners, viz.: There will be many shades of blue, from sky to navies, soft flax-flower, corn-flower, and lavender blues for solids and prints, and sapphires for sports wear. Greens will hold second place, starting with nile, and deepening through emeralds to dark yellow greens. Lime greens will be a novelty. Reds will be third favorites, shading from light, delicate pink tones to deep rose pinks. Geraniums will be included. Scarlets from light to dark are accorded a place in the novelties. Yellows are accorded fourth position as a solid. Pale shades of orange are placed in fifth position. Violets foot the list. Gray, a neutral, is regarded as a combining color and also as a foil or background for beautiful color combinations. Though not a color, white will be a top liner for the spring and summer seasons of next year, and black is certain to be a running mate.

In broken colors, the brown series, shading from beiges through tans to brown invite recognition. As for combinations, black and white, blue and white, black and green, black and red, green and yellow, are outstanding favorites. Putty is a popular neutral. Solid colors make a gain.

Designs

Flowers, leaves, buds, blossoms, branches, bouquets, twigs, and ferns in all-over and in space formation are to rule. All nature contributes, since florals are to succeed the recent vogue of geometrics and L'Nouveau. Large designs will be chosen for chiffons, gauzes, nets, tulles, voiles and allied sheers, while small fancy figures will comprise the main decorative feature for crepes.

In woven silks, crepes, crepe radiums, crepe satins, romain crepes, marquisettes, voiles, failles, cords, ribs, piques and combinations of silk and wool are international spring favorites. Shantungs will repeat their present success. Diagonals will be revived for tailormades.

Wool Dress Goods

As for dress goods, crepe weaves will be top liner in the woolen and worsted industries during the spring and summer seasons of next year, since they are practical for dresses and suits, and, in heavy weights, are appropriate for coats. Moreover, Americans are partial to basket effects, tricots, checks and similar unobtrusive constructions.

An increasing demand for crepes dyed in artistic colors is certain to strengthen for the reason that trimmings are rising with prominence and that solid colors present a fine background for trimmings in variety. Monotone tweed will have a fixed place for early spring wear in ensemble coats and tailored dresses for sports wear. The established popularity of black and white assures this combination recognition also. Both knitters and weavers find a ready sale for white flecks, neat effects, and diagonals in which black predominates.

However, as the spring season advances, worsted coatings are indicated for adoption to wear with silk dresses. A rising vogue for reps and cords in Paris will be reflected in traverse weaves developed in worsted yarns when American collections for spring are presented. Spring weights and colors in broadcloths will be found appropriate for dressy wear.

Men's Wear Fabrics

The major color and pattern trend in men's wear is definitely toward restraint. Plain goods, fancy weaves in solid colors, mixtures, and a few neat effects comprise fall selections made by clothiers. Even managers of shops whose regular customers have from ten to twenty suits avoid stocking striking patterns or colors in suits or overcoatings. Fancy cheviots are one exception which will be tried out by men who merchandise long-established clothing firms catering to the high class trade. Hoping for a change and as a sales stimulant, English manufacturers of woolens have introduced stripes and "Glen Urquhart" checks. Similarly merchants and managers of "men's shops" having a youthful clientele will show "Glen Urquhart" checks and stripes with which to brighten the range of dark colors which are to comprise the fall offerings.

"Glen Urquhart" checks and soft felt hats in fancy pastel colors are included in the wardrobes of young men who pay fancy prices to see an international game of polo, or a yacht or horse race. Overcoatings of camel's hair and allied soft weaves such as whitneys are preferred to meltons. Motorists favor boucle weaves. Warm dark dressy overcoats finished with velvet collars are volume sellers for the masses who buy only one winter overcoat annually.

In men's wear, blues, blue grays, gray blues, browns and Cambridge grays are favored colors. Browns in dark shades of tobacco have supplanted the browns of a red or yellow cast which were featured last year. Oxfords are staple.

The Textile Trend

Cotton Textile Markets: The half-cent advance in percales, made by corporation printers last week, is evidence of the growing strength in the goods market. It brings to a head the steadily gaining resistance among mills regarding present prices, and it will be more difficult for buyers to do business as they have done for months. They will have to anticipate a portion of their needs, rather than replenish stocks weekly. The summer curtailment has had an appreciable effect on deliveries.

Wool Textile Markets

Many important wool goods openings have taken place in the last few days. The American Woolen Co. announced at the beginning of the week that its spring lines were on display. The company did not make its prices known, although it is believed that they are 7½ to 15c. off from last fall. This is in line with the general market, where fabrics show reductions of 10 to 20c. on the majority of cloths, and 20 to 25c. on the better grades. So far results for spring have been disappointing. This week is not expected to show an improvement due to the Jewish holidays on Tuesday and Wednesday.

Knit Goods Markets

Determination of jobbers and retailers, especially the latter, to enter the last quarter with low inventories with the aim of carrying minimum stocks of merchandise into 1931, is slowing.

You can't beat this mercerized yarn formula

Cannon spinning and Ewing-Thomas processing provide the ingredients for a *thoroughbred* mercerized yarn.

And this is exactly the kind of product knitters are finding Ewing-Thomas Mercerized Yarns—made with quality combed yarns spun by Cannon.

If you hold to rigid standards in producing mercerized knit or woven goods — specify these yarns. They are strong, soft, lustreful—just the kind of a product that can be expected from Cannon — Ewing-Thomas.

Write for samples.

CANNON MILLS

INC.

PHILADELPHIA

New York Providence Boston
Reading, Pa. Chicago Utica, N. Y.
Chattanooga Kannapolis, N. C.
Hamilton, Ont., Canada

Sales Agents for
EWING-THOMAS CORP
Mercerized Yarns and Thrown Silk

Sole Sales Agents for
AMERICAN ENKA RAYON

Sales Agents for
IMPORTED DUTCH ENKA RAYON
for the Southern States

CANNON YARNS

up demand for knit goods. Hosiery demand is steady but light, and buyers show little interest in covering for Christmas. Women's full-fashioned continues to move, grenadines being the preferred line. Half-hose is stronger in the cheaper lines; 25c. and 35c. numbers find a quick market. Fancy sweater movement marks outerwear; 1931 bathing-suits are hesitant, as market is waiting to see results of a price cut by one leading firm. Heavyweight sweaters are in fair call.

Silk Textile Markets

Raw silk sprung a surprise by dropping to a new low of $2.50, after a week that promised well. Prices held moderately firm for several days, even tending upward, but Monday brought a weakening, which resulted Tuesday in a sharp recession. Buying was fairly active all week. Thrown silk was hesitant, reflecting the weak condition of the primary market. Spun silk is slow; prices are steady and stocks in spinners' hands are moderate. Knitted outerwear mills are buying considerable quantities, mostly for fancy sweaters. Broadsilk fabrics sell irregularly; all buying is of "fill-in" type, and cutters refuse to cover ahead. Cantons are steadier, with less underselling. Weavers more confident of outlook and report good reaction to winter resort offerings.

Financiers Watch Cotton Combine

Further Steps Taken in Drawing Together Fine Goods Mills

FINANCIAL centers of the textile industry were quiet this week and there were only minor changes in most textile stocks. Most of the changes, however, were declines. Industrial Rayon dropped 7⅞ to 78⅛, Collins & Aikman was off 4⅞ to 17. Real Silk Hosiery had a 5-point swing during the week but closed relatively firm. The Boston stock auctions had only limited offerings which went at about the same as previous prices.

The Fine Goods Combine

There is increasing interest in and optimistic hope for the General Cotton Corp., which as a holding company, may draw under its wing a large part of the fine cotton goods industry. Its success will be a constructive move, according to many observers.

Stockholders of the Davis Mills and the Lincoln Mfg. Co. voted on Sept. 24 to accept the offer made by the General Cotton Corp. for purchase of their properties. Each vote was slightly below the 85% specified in the offer, but the prospective purchaser may waive this provision. The plan calls for an exchange of 6 shares of General for one of Davis and 1½ shares of General for one of Lincoln. Little was disclosed about the purchasers except that Homer Loring, Malcolm G. Chace and Edward Chace were interested. Stockholders objected that they were left in the dark as to the make-up and purposes of the General Cotton Corp., but, since both Davis and Lincoln had no other prospect ahead of them, the affirmative vote was large.

New Bedford in Combine

Word this week from New Bedford, Mass., states that a number of New Bedford cotton mills are reported to be favorably inclined to the formation of the fine cotton goods cartel which plans to provide stabilization of the fine goods industry. Following lining up of a number of Fall River mills and plants in Rhode Island, Malcolm Chase and Homer Loring have held several conferences in New Bedford, and succeeded in obtaining the promise of cooperation from a number of manufacturers.

The plants promising their support are reported to include Neild, Bristol, Booth, Dartmouth, Hathaway, Associated Textile, Wamsutta and Tabor. Free agents, but working closely with the general plan of the General Cotton Corp. are Pierce Mfg., Pierce Bros., Ltd., and Grinnell, with Soule and Potomska said to be divided on the plan. The Nashawena and Nonquitt are inclined to preserve their independence though inclined to cooperate in the matter of guiding production.

Lackawanna Committee Offer

The stockholder-creditors committee interested in the affairs of the Lackawanna Mills, Scranton, Pa., are offering to buy claims of creditors for such additional sum as will bring the total return to the individual creditor to 80% of the original indebtedness of the Lackawanna Mills to him. The committee holds notes amounting to about $145,000. The receiver has decided to discontinue the operation of the knitted overcoat department and wind up the business. The committee wishes to avoid disposal of plant at auction in which event they state, "the equities of all creditors will be seriously jeopardized."

Naumkeag Dividend

The Naumkeag Steam Cotton Co., has declared a regular quarterly dividend of $2 a share payable Oct. 1 to stockholders of record Sept. 24. "Packaging of sheets and pillow cases in attractive and useful boxes has proven a real

MILL STATEMENTS

Name and Address of Company	Line of Business	Fiscal Year	Assets						Total	Liabilities and Capital		
			Cash and Debts Receivable	Raw Materials, Mdse., Etc.	Total Quick Assets	Real Estate, Buildings and Machinery	Miscellaneous Amount	Miscellaneous Description		Accounts Payable, Floating and Funded Debt	Capital Stock	Surplus, Profit and Loss, Reserves, Etc.
Pepperell Mfg. Co. Biddeford, Maine	Cotton	June 30, 1930	$3,153,845	$7,390,679	$10,544,524	$8,870,090	$234,246	Prepaid items	$19,648,860	$322,310	$10,590,800	$8,735,750
		June 29, 1929	3,591,185	8,101,297	11,692,482	10,125,309	865,262	Prepaid and securities	22,683,054	258,575	10,793,000	11,631,479
Brookside Mills Knoxville, Tenn.	Cotton	Mar. 31, 1930	702,924	1,436,546	2,139,470	3,956,165	16,406	Prepaid items	6,112,041	1,056,956	1,600,000	3,455,085
		Mar. 30, 1929	1,423,289	1,104,470	2,527,759	3,847,261	10,213	Prepaid items	6,385,233	1,159,585	1,600,000	3,625,648
Corticelli Silk Co. Florence, Mass.	Silk	June 30, 1930	1,169,647	2,280,613	3,450,260	1,967,121	918,080	Miscellaneous	6,335,461	1,170,512	4,000,000	1,164,949
		June 30, 1929	2,301,572	4,005,806	6,307,378	2,364,612	530,363	Miscellaneous	9,202,353	2,853,260	4,000,000	2,349,093
Farr Alpaca Co. Holyoke, Mass.	Wool & Cotton	May 31, 1930	7,067,111	4,807,248	11,874,359	7,599,923	91,364	Prepaid Insurance	19,565,646	392,717	14,000,000	5,172,929
		May 31, 1929	7,606,303	4,675,941	12,282,244	8,000,000	.....	.....	20,282,244	409,414	14,400,000	5,472,830
Wonalancet Co. Nashua, N. H.	Cotton	June 30, 1930	108,126	356,787	464,913	161,788	4,818	Insurance	631,519	.....	400,000	231,519
		June 30, 1929	201,808	292,939	494,747	175,982	16,708	Miscellaneous	687,437	.....	400,000	287,437
Waltham Bleachery & Dye Works Waltham, Mass.	Finishing	Dec. 31, 1929	35,848	33,117	68,965	821,338	1,176	Investment	891,479	403,658	300,000	187,821
		Dec. 31, 1928	52,777	14,413	67,190	804,693	.....	.....	871,883	537,160	300,000	34,723
Pierce Mfg. Corp. New Bedford, Mass	Cotton	Dec. 31, 1929	405,469	1,403,725	1,809,194	834,136	.....	.....	2,643,330	76,159	600,000	1,967,171
		Dec. 31, 1928	788,985	1,100,805	1,889,790	834,956	.....	.....	2,724,746	65,090	600,000	2,059,656

QUITEX Spun Rayon... New... makes up into salable fashionable fabrics . . .

Quissett Mill announces this new spun rayon at a strategic time . . . when popular demand runs high for fabrics which are woven or knit from just such yarn as Quitex.

With Quitex comes the Quissett 20-year tradition of fine cotton spinning . . . the Quissett mastery of the spinning craft . . . the Quissett attention to the small details in yarn so essential to smooth, low-cost production . . . and the Quissett ability to produce quickly yarns for special needs.

Executives seeking new fabric effects . . . interested in the profits awaiting unusual fabrics . . . should look into Quitex Spun Rayon. Write for samples.

Our quotations based on Cost + a reasonable profit.

Quissett Mill
New Bedford, Mass.

Wm. M. Butler, Pres.
Edward H. Cook, Treas.
Thomas F. Glennon, Agent

QUISSETT MEANS QUALITY

stimulus to sales and the approaching holiday season is expected to see a larger demand for these gift sets than ever before," declared Treasurer Ernest N. Hood at the meeting of the board of directors at Salem.

Discussing the situation, particularly as it applies to sheets and pillow cases in solid colors and colored hems, he declared that this type of goods has already been of considerable assistance to the retailer because the gift sets make it possible for the domestic departments of retail stores to participate in the holiday business to an extent heretofore unequaled.

Dominion Woolens Shows Loss

For the year ended June 30, 1930, Dominion Woolens & Worsteds, Ltd., Peterboro, Ontario, reports net loss after depreciation, interest charges and reserve for bad debts of $294,890. In the preceding fiscal year there was a profit after similar charges and before income tax provision of $126,993.

Southern Decline Continues

Charlotte, N. C.—A decline of 48c. in the average bid price per share was recorded the past week in a group of twenty-five common stocks according to the weekly report of R. S. Dickson & Co. The closing bid price stood at 65.60 as compared with 66.08 for the previous week.

Lean Third Quarter in New Bedford

The third quarter was a lean one for New Bedford mill shareholders, the average distributed being 40c. per share. The amount distributed was $173,235 in regular dividends, while in addition the Acushnet Mill paid out $160,000 as the second liquidating dividend of the corporation. This represents $10 per share, and makes $40 per share distributed since the stockholders voted favorably in liquidating the affairs of the mill. Other disbursements are anticipated before the end of the year.

For the third quarter, Hathaway passed the dividend, this being anticipated. Dartmouth common and Pierce reduced their dividends, Dartmouth paying $1 where $1.50 has been paid previously, while Pierce cut the rate from $4 to $2. Dartmouth distributed $24,000, including $2,500 on 2,000 shares of preferred stock. Pierce paid out $12,000, the same amount as Neild, which distributed $1 per share. Soule paid $1.50 per share, the same rate as Gosnold preferred, Quisset paying out $25,000, representing $1.25 per share. Kilburn paid $22,500, at the rate of $1 per share.

Boston Stock Auctions

The following sales of textile shares were made at Wednesday's auctions:

Shrs.	Mill	Par	Price	Change
96	Associated Textile....	...	35-36½	....
6	Queen City Cotton....	100	12½	....
20	Plymouth Cordage....	100	73	....
10	American Linen.....	100	1¼ lot	....
132	Total			

Active Month for Cotton Yarn

Good Inquiry for Carded Weaving Counts

Philadelphia.

ALTHOUGH there are two business days remaining this month, spinners and dealers are ready to report that September has been the best month in respect to new orders and shipments on old that they have experienced since the first months of the year. Specifications have improved at least 30% over August with the majority, and new business has expanded 15 to 20% over the preceding month. Improvement with many of these spinners and dealers has been more than seasonal.

Spinners have booked enough business to run them several weeks ahead. The effect of this is noticeable when cotton declines, spinners holding yarns slightly firmer than the raw material market acts. Yet there are many still in need of orders for October shipments, and these factors are causing weakness on part of sellers. An example of this is in quotations of 19c. for 10s cones named by one seller. It is a full cent under the market, and has hurt trading with other sellers.

More Confidence Displayed

While there is considerable talk among manufacturers and dealers that cotton has not struck bottom, all admit this cannot be far off, and those who begin purchasing at current levels cannot go wrong. Spinners in numerous instances are acting upon this assumption and covering their cotton needs many months ahead, believing that within next four to six months this cotton will have increased several cents in price and that yarns will have moved even higher in view of the present abnormally narrow spinning margins.

It is for the latter reason that spinners are not anxious to book business running months ahead, feeling that they should not sell more than a month ahead at present unprofitable prices. They prefer to wait until late fall before selling production for that time. There have been numerous instances where spinners evidently want actual orders in hand for this period and have accepted large orders which will run for the next six months; one for 400,000 lbs. in this category was placed by a carpet manufacturer.

Knitters Inclined to Wait

Other sales calling for almost as large quantities have been reported in weaving lines, knitters being inclined to wait. Many of latter have higher priced yarn contracts which they are working out before they will consider their needs far ahead. Knitters buying from the local market are not so busy as are weavers in this section, the bulk of trading during September having been with weavers.

Weaving Lines Active

Most weaving lines have been active buyers with exception of plush, and these manufacturers have not been booking goods orders in amounts to justify new yarn commitments. Men's wear mills and tapestry concerns have been buying during recent weeks especially active trading being reported with the latter. Manufacturers of specialties such as cheap towels, laundry nets and salad bags, have been busy, particularly those catering to low priced field, chain stores having been buying larger volume of low priced cotton manufactures.

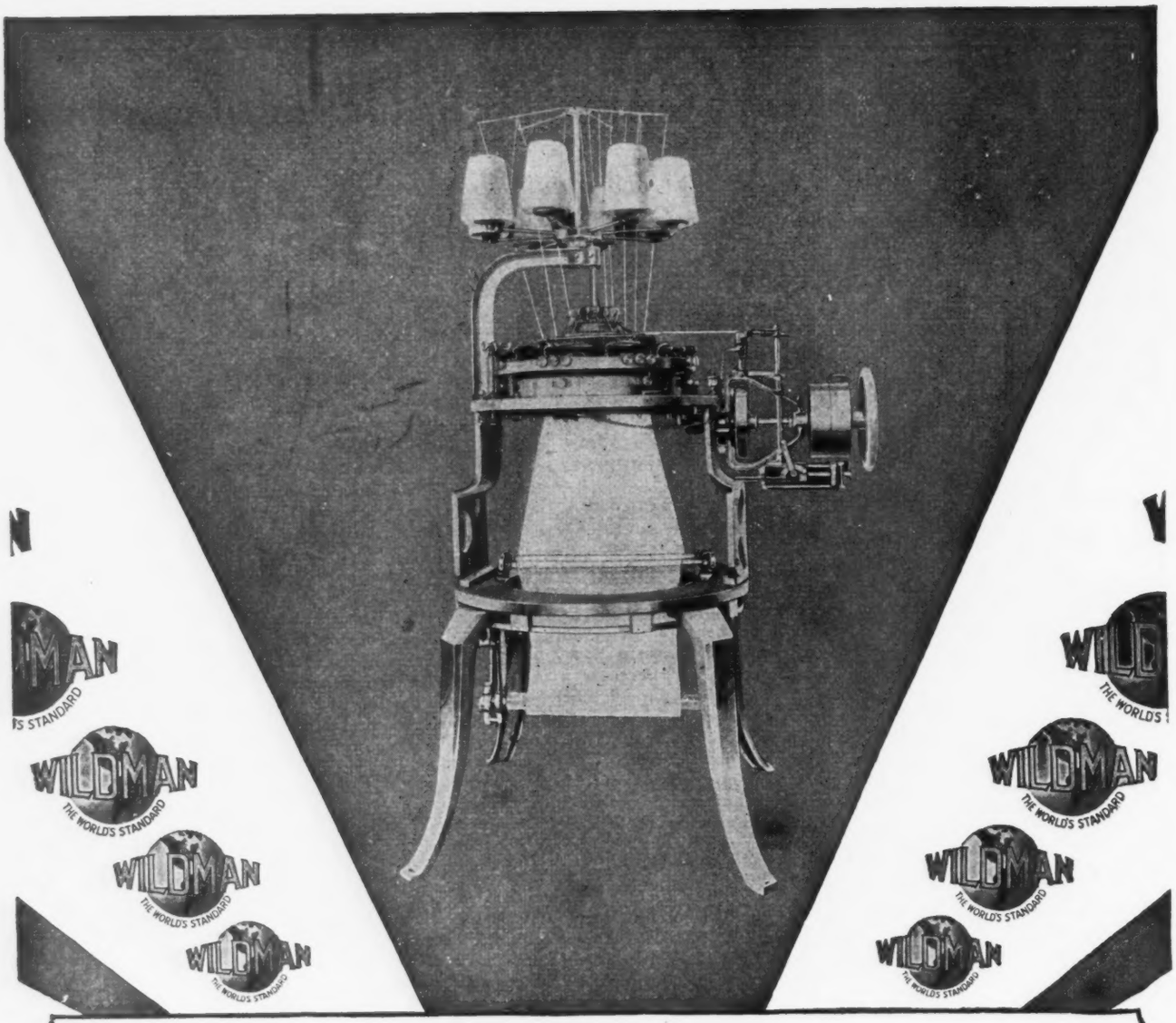
Weaving counts have sold during the month at 22 to 22½c. for 20s-2 warps of average grade while spinners have been quoting 22½ to 23c. Although cotton has been uncertain this week, weaving counts have held their own, and it is difficult to locate spinners who will take less than 22½c. for this count. Tapestry mills have bought fair sized lines of 30s-2 warps paying around 27 to 27½c. Deliveries run during October and a smaller number for next two months, but the average spinner has not sold his production more than a few weeks ahead, and then not solidly.

Combed peelers have shown even less interest than carded knitters. Combed spinners have a fair amount of business on their books but are not receiving specifications. This also applies to processors, who have experienced a dull month, although specifications improved slightly. Combed and mercerized have barely shown seasonal improvement; carded yarns have done better than seasonal.

●

New York—After several satisfactory weeks, carded yarn buying slowed up during the current week. A considerable amount of inquiry came into the market, but sellers noted that it was more difficult to complete sales. Buyers have not raised their ideas of price, while spinners are firmer and less inclined to trade. The inability to bring the two groups together has caused the postponement of considerable poundage.

In several quarters there were reports that consumers were showing more interest in late deliveries. Webbing manufacturers, weavers and carpet mills sent in bids for fair quantities. In many cases these were for delivery for the first quarter of 1931. Insulators were less prominent than they have been for the last few weeks. Purchases by this trade did not amount to more than fill-in lots



For Rayon Fabric of finest gauge and perfect plating—the Wildman Body Machine.

WILDMAN MANUFACTURING CO.
Norristown, Pa.

WILDMAN
THE WORLD'S STANDARD

WILDMAN
SPRING NEEDLE BODY MACHINE

of a few thousand pounds. Knitting yarns were in moderate demand at steady prices.

Prices were firm and except for the higher count 2-ply warps, changes were scattered and fractional. The 30s-2 to 40s-2 warps and skeins weakened slightly and met current bids.

Fine Worsted Yarns Wanted

Knitters Taking Zephyr Yarns In Volume

PHILADELPHIA.

IMPROVEMENT reported in market during the last five weeks has been maintained, but there has been no further expansion this week. Spinners and dealers are doing better business than a month ago with men's wear, dress goods and outerwear mills, and the former have not only moved a large portion of their stocks but now have a fair amount of business booked ahead.

Although finer grades of wool and top have strengthened during recent weeks, there has been no change in yarn quotations. The difference is seen in the refusal of spinners to bid as low for orders as they formerly did. Quarter blood is still in less active request than finer grades, and prices of these are not so steady as yarns spun from 64s.

Outerwear yarns have been the most active, with counts used in women's two-piece knitted suits leading; and yet there has been no indication that prices of these counts are about to advance. Asked regarding this, one spinner said that, so long as wools going into these yarns stayed at their present level, they would make no change in quotations; but, should demand for fine yarns further strengthen wools, then they would have no other recourse.

QUOTATIONS UNCHANGED

English spun outerwear counts are quoted around $1.05 for 2-20s, 50s, some spinners offering this grade slightly above and some slightly under this figure. Manufacturers are paying $1.05 in instances, but there have been no large sales reported at $1.07½ level for this grade and count. Buying in outerwear counts is seasonal, and demand will not continue throughout the year at the present rate, but buying of the last five or six weeks has brought about a definite change in attitude of sellers. When demand is less active, it is highly improbable that spinners will go back to their practice this summer of accepting practically any offer to book new business. The market is healthier and firmer, and will keep these attributes because of the improvement in spinners' statistical position during this buying wave.

Men's wear manufacturers are beginning to buy yarns for their lightweight goods, and, although the business has not been widely distributed, a substantial amount of mixture contracts has been placed to be delivered during the next three or four months. More mills have shown their new lines, and, as goods orders are booked, more mills are showing an interest in yarns to go into fancies. Prices of mixes are steady and unchanged, spinners quoting $1.70 for 2-30s, 64s.

Dress goods yarns have been moving at a more rapid rate during recent weeks than at any time this year, and, although spinners complain bitterly about low prices paid in such sales, the volume has been large with several concerns in this section.

These mills, as is true with men's wear and outerwear manufacturers, are specifying fine yarns in more cases than before, and for the time being there is relatively little interest in quarter bloods. Spinners as well as manufacturers of outerwear are in doubt as to what will occur next in this matter. Will quarter blood yarns and goods return to their former position of popularity, or have finer grades taken their place permanently?

For the time being manufacturers are hedging, buying yarns for both quarter blood and fine garments. They will see which sells most actively, and then specialize on these lines; but at present they mean to have both lines to offer customers.

◆Uneven Demand for Thrown Silk

BROADSILK mills and hosiery knitters are showing uneven interest in thrown silk. Business is being placed, but only among a scattered group of throwsters. Some thrown yarn firms have difficulty in moving their stocks. Orders are decidedly behind normal, and the outlook is uncertain. The steady buying that marked the beginning of the month has tapered down to nominal, in some cases. Broadsilk mills are producing lightly on all fabrics except cantons which are selling well; canton yarns are moving somewhat less than proportionately, but steadily enough to bring some encouragement. Low-grade Japan yarns also are being sought by the weavers. All buying is light and for immediate shipment.

There is scant interest in tram yarns. Hosiery knitters place few orders for grenadines, much less than was the rule a couple of weeks ago. Throwsters are confident, despite the present easing off, and they expect September total turnover to be fairly satisfactory. Hosiery mills are hesitant about producing for Christmas, due to the indifference among buyers. The Christmas outlook is less promising than it was last month, and mills are averse to building up a holiday stock until their outlets manifest more confidence and start buying ahead.

◆Silk Spinners See Good October

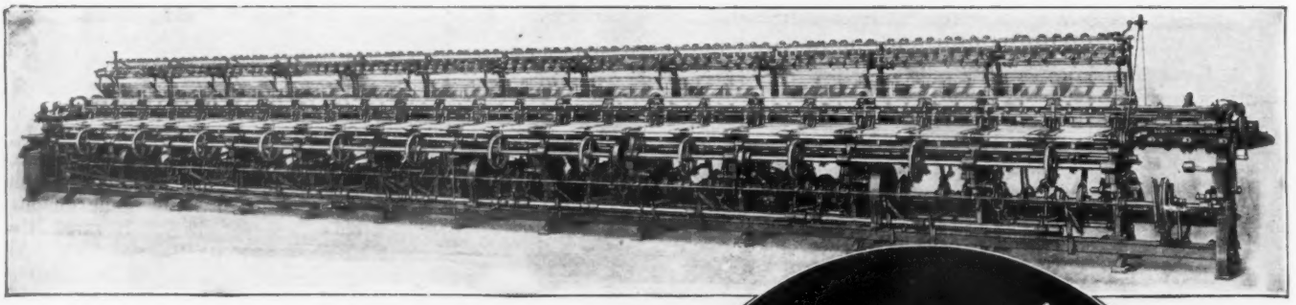
SILK spinners have passed a slow week; there is only a fair demand from weavers and knitters, but the market tone is firm and the prospects for October are considered good. Prices are steady; careful watch on production is keeping stocks low, and there is no pressure to clear. Quotations are firmer, if anything, than they were a couple of weeks ago, due to the healthy stock situation. Some mills are getting business from the knitted outerwear group, this yarn mostly going into fancy sweaters. Broadsilk mills are holding back on contracts, pending their spring fabric openings next month.

Spinners look for an active demand from these weavers for shantung yarns as soon as the mills have had some reaction from the trade to their new broadgoods lines. Weavers are optimistic about the spring outlook for fabrics of spun silk content, particularly shantungs, and will show unusually varied lines in this field at their openings; the spinners expect this to be followed by good business. Woolen and worsted manufacturers are indifferent, and are placing little or no yarn business at present.

Steady Call for Rayon

Spurt Slackens, But Mills Continue to Show Interest

THE spurt in rayon yarn buying which resulted in a surprising turnover within a few days last week, has eased off, but the market continues firm and the outlook is fair. There is a steady undertone, and the pressure for price concessions has lessened considerably; underselling is far from extinct, but it is the exception rather than the rule. Some medium-sized rayon plants are reported to be doing an exceedingly active business, and as this group includes firms that had been offering special inducements, buyers now find themselves



Pages 186-1 .. to 186-30

What do you know about Reinforced Selvedge and Shadow Clock attachments? Do you know that they will improve the sales of your hosiery? Do you know that we can supply these attachments for any Reading Machine immediately and install them in a few days' time? Are you aware that "Reading" and *only* "Reading" can give you this valuable service?

All the parts and motions for these important attachments are illustrated and described in the new thirty-page supplement to the Reading Parts Catalog. Have you received your copy? If not, send for it today and keep yourself informed on the latest mechanical developments in the full-fashioned hosiery industry. You are entitled to *and should receive* this kind of service from your equipment manufacturer.

TEXTILE MACHINE WORKS
Reading, Pa.

The "READING"
Full-Fashioned Knitting Machine

obliged for the most part to pay list prices.

Stocks of rayon in hands of producers are estimated at between 20,000,000 and 25,000,000 lb., which represents less than two months consumption in normal times. The stock situation is considered fairly satisfactory. The larger producers have a moderate surplus of standard yarns, but they are behind in delivery of special numbers. In many instances production parallels sales.

Business on the books for September is good. Knitters are showing much interest in 150s, both regular and multifilament, particularly the low luster yarns. There is also a good call from the same group for 100/40s. Cotton weavers are buying 100/40s for the production of fine fabrics; broadsilk mills are placing fair-sized orders. Consuming groups gain confidence slowly; buying is still spot, though some October business has been placed; there is no real future trend, and producers do not look for advance buying to develop before the end of the year. Two significant points at the moment are the lessening of silk competition pressure and the waning of the price guarantee agitation; buyers are not so inclined to use these arguments in negotiating for yarn concessions. It is estimated that rayon turnover now is about 70% of normal. As one producer put it, "we feel we are doing a rushing business, but this is because July and August were so very backward."

The outlook is better. Prices are steady, and producers look for buying to make gradual inroads on surplus stocks during the last quarter.

◆Rayon Waste Demand Lighter

INCREASED inquiries for open bleached has brought encouragement to rayon waste dealers this week, but actual business registers little change. All orders are spot and small, and buyers are putting up strong resistance to quoted prices. Stocks in hands of dealers have been reduced slightly, but not enough to start a real firming. Thread waste is easier, and some underselling is reported. The tone of the consuming industries is uncertain; top manufacturers are shopping around, asking for quotations on small lots, and garnetters show very little interest. Rayon waste dealers are marking time for the most part; some try to hold to list, but the majority are willing to make concessions to effect turnover.

◆Cotton Waste Prices Nominal

BOSTON.

THERE are no new developments in the cotton waste situation. Spinnable materials, particularly peeler comber, and thread wastes of all kinds continue to sell in a small way at firm prices, but dealers do not look for any business of consequence until the raw-cotton situation shows some signs of stability. Demand for other types of waste is practically at a standstill. A few liquidating sales in the several wastes are being put through by holders who are in need of money, but in general dealers are refusing to grant concessions from current market prices. Around the first of November freight rates on cotton wastes are likely to be put on a mileage basis; this may be considered a generally favorable feature, and one that will facilitate their movement from producing to consuming centers. Prices are largely nominal owing to thin demand and unchanged from a week ago.

Cotton at New Lows

South Sells More Freely But Trade Buying Offers Resistance

AFTER a period of indecision and inactivity, the cotton market during the week developed a more pronounced downward trend and prices declined about ½c. per pound, bringing the entire contract list to new low levels for the life of the contracts and for the new season. The volume of business also increased materially, and, while the market sagged rather steadily, it gave way slowly and stubbornly, meeting opposition from the trade. The volume of trade buying was decidedly larger as the market declined, and it was the opinion of many that there were very large orders on a scale down. This demand seemed to come from both domestic and foreign spinners. The fact, however, that the trade abroad has been buying rather more freely than have the domestic mills, made it apparent that much of the demand was coming from foreign spinners both in Europe and in the Far East.

BUYING SUPPLIES FAR AHEAD

Underlying conditions in the market were not materially changed as far as the prospective supply and demand were concerned but the attitude of many of the mills seemed to show that prevailing prices were proving more attractive. In fact, it was said that orders were being placed against requirements a long distance in the future, some mills buying against their needs for at least a year while others went further and were making contracts as much as two years ahead, if not even longer.

A feature in the week's developments was a noticeable increase in the volume of southern selling. Whether or not this could be taken as any evidence of any weakening on the part of the southern holding movement was not entirely clear, but it seemed to be in line with the expectations and predictions of many traders that as soon as the movement of cotton became more general over the belt, there would be a corresponding increase in the hedge selling by the South. The increased pressure from this source evidently failed to have as much influence on values as some had predicted, although the steady decline in prices was thought to show that the amounts of cotton being sold were somewhat in excess of the demand and possibly reflected the absence of speculative interest on the buying side.

The action of the other markets seemed to contribute to the declining tendency in values. The pronounced weakness in wheat and the fact that numerous other commodities had declined to new low records for the season came in for a great deal of comment and some students of conditions continued to express the opinion that commodity values in general were still on the down grade and that in consequence, cotton could hardly be expected to prove an exception to the rule. The weakness in the stock market was also a factor as the action of securities was taken as a barometer of general business conditions and some thought that it might be an indication of fallacy of numerous optimistic forecasts relative to the action of the markets during the last quarter of the present year and of the revival in business.

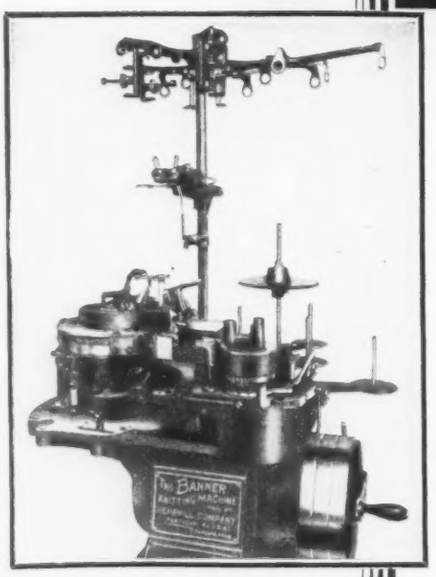
LITTLE INTEREST IN CROP ADVICES

Weather and crop advices were given rather superficial attention as, in the absence of any developments which might be construed as having a pronounced influence on yields, the trade seemed convinced that present indications are that the last forecast by the Agricultural Department will be equalled if not actually increased. Whether or not the crop will be materially benefitted by the rains remains to be seen but it was the consensus of opinion that the only danger to be feared now in connection with the crop developments is an early frost.

In view of this attitude on the crop and the feeling of assurance that the supply of cotton for the coming year will be an abundant one, cotton traders have been more interested in the prospects for consumption.

There have been a few signs of improvement in the textile situation both here and abroad, but, according to close students of the market, these have hardly been sufficiently pronounced to raise hopes of any immediate broadening in the demand for the raw material unless, as intimated, the price should prove attractive enough to induce spinners to lay

BANNER 12 STEP
now knits anklets!



READILY salable anklets styles can be profitably produced on the new Banner 12 step machines—2½ inch cylinder and larger.

Recent Banner 12 step innovations give unusual facility of production. In this machine single stitch patterning is brought to perfection. The Collapsible Drum System of Control with single-can adjustment reduces time of changing patterns to a minimum. Patterning capacity is exceeded only by the Banner Jacquard machine.

Round out your line with anklet numbers—most profitably knit on Banner 12 Step Machines. The 12 step attachment can be applied to all Banner models.

THE BANNER AUTOMATIC HOSIERY MACHINES

HEMPHILL COMPANY

Pawtucket, R. I.

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in supplies for a long period ahead. The ginning figures published during the week, showing that up to Sept. 16, 3,729,683 bales had been ginned, failed to alter opinions materially regarding the size of the new crop but confirmed the prevailing opinion that crop is early.

●

MEMPHIS, TENN.—Staple cottons attracted a little more attention during the week, but mostly in the way of inquiry with a few actual sales resulting. Inquiry was for deliveries running through the late months of the fiscal year. The staple association says good premiums are offered for quick shipment, but that, owing to the slow movement of the new crop, it is not always possible to accept such orders; merchant stocks provide ample supplies of old crop cotton from which such orders can be filled.

Many mill representatives have been in the market during the last week or ten days; they seemed more bent upon viewing the crops of the territory than arranging for requirements. The staple basis is officially quoted unchanged on 1 3/16 in., but 1 1/8 in. is quoted 25 points down, and 1 1/4 in. 100 points down from the previous week. The quotation which is more or less nominal is as follows on strict middling: 1 1/8 in. 125 points on new style December, 1 3/16 in. 300 points on, 1 1/4 in. 800 points on. Recent rains, which many expect will improve the staple, may explain the easier basis; basis on 1 3/16 in. was reduced 50 points the previous week. Frequent rains throughout the territory early in the week delayed picking and adversely affected grades, and may have been the influence behind the improved inquiry for the better grades.

Exports are well ahead of last year at this time, and fair business seems to be pending. More foreign as well as domestic business could be done but for differences in ideas as to basis. Domestic demand centers on middling and strict middling 7/8 in. to 1 3/32 in., and low grades sought at prices ranging from 7 1/2 to 8 1/2c. for southern mills, and selected inch to 1 3/32 in. for New England. Merchants are buying some cotton on seller's call; some cotton going into the hands of the co-ops. The volume in either instance is small, attributable, for the present at least, to the slow movement of the crop in this territory. The staple association to the end of the week had received only 23,000 bales from the new crop; the association carry-over was 80,000 bales.

Wools in an Exclusive Market

Foreign Happenings Negligible; Merino Position Favorable

THE wool market is more active and also broader than it was a week ago. Topmakers and manufacturers have shown a decided interest, though not paying any higher prices and still seeking concessions. The amount of wool being sold is decidedly encouraging. Wool merchants are not anticipating any rise in price in the near future, but on the other hand are convinced that a very firm and stable position has been achieved by sellers.

The London sales opened as expected, merinos meeting a good demand with the Continent taking the finest types at prices unchanged from last closing, while Bradford and the Continent bought a considerable weight of good merinos 60s up to 70s on a 5% decline from last series. Greasy crossbreds were off from 5 to 7%.

While events in the foreign market during the past week had very little influence on the domestic situation, the several openings indicated very substantial stability for merino qualities of wool. The position of fine wools, which represent the greater portion of the domestic clip, is not troubling the local market to any degree, but in the case of crossbreds which have been in relatively small call, and in which stocks are said to be relatively substantial, there is some little uncertainty, particularly in view of the general downward trend in the foreign markets and the coming forward in a few weeks from now of the South American and New Zealand clips.

Independents and cooperatives would both like to see larger mill buying, but attempt is being made to force the market. There is a big amount of wool to be sold, and, while it may all be wanted in good season, it is recognized that the problem of the wool district is the merchandising of an immense volume of domestic wool in a lethargic market. The cooperatives control a huge block of wool, and the selling of this will no doubt be handled conservatively; at the same time, however, it is a new and untried experiment.

Now that the Australian season has opened it is expected that the policy of extending the season over eight months of the year will be followed in view of present trade conditions, as partial safeguard against an unwarranted slump at any point. Reports from different European chambers of commerce, from the United States, from big industries with their own federations able to make inquiries over a wide area, and from individual sources give little hope of any general immediate trade recovery, and point to possible improvements being at best only seasonal.

The mohair market, which has been nominally firm for many weeks, has moved down a few points, owing to very slack demand. The foreign hairs in bond, Turkey fair average and Cape firsts, are now quoted nominally on a range of 25 to 28c. Imports of alpaca into Boston have been quite constant for the year to date. The foreign markets now show a downward tendency in this commodity, which has been selling relatively high when compared with the types of mohair imported into Boston.

BEST SUBSTITUTES FIRM UP

Further slight improvement is seen in woolen rags and reworked materials. Mill operations utilizing these commodities are moving slowly to larger capacity operations. There is a constant demand for cheap substitutes for wool, and, while in some cases low wool values may lead to displacement of certain substitutes by wool, such instances will only prove the rule that other things being equal the cheaper materials get the business. Since prices have been revised downward, the market is steady on an attractive basis. Manufacturers of these commodities are inclined to ask a cent or two more per pound for carbonized carded materials made from high-grade and unmanipulated rag stocks. News that there is some pick-up in the overcoating division of the goods market is viewed as favorable and on the appearance of colder weather a much needed stimulus may be supplied.

The graded rag market is dragging along with very little change. Grading is on restricted schedule, speculation dormant, prices based upon 5 to 5 1/2c. for mixed softs, and mill demand still very spotty. Yet on the whole there is a better undertone, based upon the high probability that the worst has been seen for the year 1930. General improvement in the demand for soft rags has been maintained in the Dewsbury district, but without any material change in prices. The low price of wool has had the effect of depressing white flannels and white knits to the lowest point touched for many years past.

MILL WASTE SUPPLY INCREASES

The demand for wool waste is not over good; the seasonal call is still lagging, and nothing is in sight at the moment to bring about any large outward movement on either white or colored waste to the mills. In addition to other troubles, the market has to contend with cheap wool. Although the demand is for cheap fabrics, a number of the American mills are set upon the production of attractive high-grade materials, and to this end are using fast and attractive dye-stuffs and as much virgin material in the make up of the fabrics as the traffic will stand. Dealers do not look for any slump in waste values, although admitting that, if poor business continues much longer, there may be some liquidation of odd lots at concessions. The best materials con-

tinue very firm in price, although increasing activity in the wool combing branch of industry presages larger supplies of top and worsted card wastes.

SUPERFINE NOILS SELL BETTER

Noils are in fair demand with fine and half-blood leading. Prices on all grades are lower than they were a week ago. It is more of a buyers' market than at the beginning of the month, and this is owing to the limited volume of business bringing about a desire, if not necessity, on the part of some dealers to liquidate part of their holdings. Hatfelt manufacturers are now becoming more active; this is a good sign as to increased business in superfine noils. Medium and low grade noils are in very small demand, and sales in bulk are so infrequent that prices must be considered nominal. It is not likely that there are any fairly good sized stocks of domestic noils which could not be sold on prevailing thin market except at a loss. It is a waiting situation, promising a more active market during the weeks to come.

CONTINENTAL NOIL MARKETS

Bradford reports outlook for business with the United States as fairly good, less demand from the Continent, domestic manufacturers not buying, and crossbred noils showing an easier tendency. In the Roubaix market manufacturers have been buying fine crossbreds noils but the export trade with the United States is still indifferent. Prices have declined recently from 10 to 12%.

Silk Reflects Japan Drop

Market Weakens Despite Better Buying Tone

THE raw silk market has weakened once more, and prices are 7 to 10c. off. A confusion of reports reaching New York, as to Japan's plans for disposal of her surplus stocks, now in warehouse, are partially responsible for the depression. There is keen competition in the New York market, and some of the Japanese firms there are selling below list to effect turnover. Other companies make an effort to resist the downward pressure, but usually it means loss of business. There is no strength in the market at any end, and importers are frankly discouraged.

The failure of the market to improve, in the face of a light but steady growth of demand, presents a puzzling problem; importers did not look for a sharp upturn, but they anticipated a gradual firming when broadsilk mills began buying. Demand from these mills is nothing to crow about, but it is sufficient to warrant some signs of strength. Weavers enjoy a fair movement of fabrics, and are operating steadily. Hosiery knitters show more interest than weavers at present, and are placing some business. Orders tend to make up in numbers what they lack in individual size. It is also significant that some hosiery mills have begun buying ahead; importers were taking orders this week for October-November delivery.

BUYERS MORE CONFIDENT

Confidence is growing at the consuming end. Manufacturers talk more optimistically, but are slow about translating this optimism into orders for raw silk. So far as the price drop is concerned, it is clearly a case of the New York market being unable to withstand the force of the prevailing weakness in Japan. The domestic situation does not justify the current downward trend, and that was made clear several times during the week in trading on the National Silk Exchange, when traders, encouraged by a firming demand from manufacturers, refused to meet new lows that prevailed in Japan. However, there is little likelihood of any steady improvement in the American market until the Japanese tone strengthens, and until the Japanese government once for all clarifies its position as to disposal of the warehoused stocks.

◆Slight Improvement In Hosiery Demand

HOSIERY knitters are much interested in the possibility of developing volume business in men's full-fashioned numbers. At present, these lines move lightly, demand centering on staple shades and limited to refills. The coming holiday season is regarded as offering a good opportunity for stimulating demand for men's full-fashioned, though it is conceded that this is a bad year in which to launch any such venture.

The undertone in the half-hose market is somewhat stronger. There is a steady call for all-overs, spirals and parallels, in both lively and conservative designs. Demand is mostly for half-hose to retail at 50c. and downward. Chain stores are placing fair-sized orders for 25c. and 35c. socks, chiefly all-rayons and rayon mixtures. Half-hose prices are weak. Mill men, who try to book business at list prices are confronted with the argument that some other firm is underselling them on supposedly identical merchandise. There is considerable distress merchandise available. Mills are being pressed by silk creditors for payment of bills and are offering stocks at unprofitable levels to obtain quick cash.

Women's hosiery is steadier, though here too demand is strictly spot. Mills specializing in grenadines claim to be moving these lines actively; some knitters who carry both trams and grenadines find business about equally split between the two divisions. Market reports on grenadines conflict so sharply that it is difficult to accurately gage current demand. Some producers make extravagant claims of high-pressure buying, while others say they are dropping grenadine altogether. Measuring one against the other, it seems that grenadines are in a fairly strong position, with a good outlook as a holiday proposition.

The one weak element is the downward trend of grenadine prices.

◆Miniature Golf May Help Sweater Sales

THERE is considerable doubt in the knitted outerwear market as to whether bathing-suit producers as a whole will follow the lead of one important producer who has announced a line of all-worsted ribbed bathing-suits at a new low of $11 for men's and women's and $9 for boys'. Knitters at first regarded the announcement with some concern, but now they are inclined to stick by their guns and hold to list.

It is not believed that the difference is great enough to make a perceptible effect on market demand. Producers say they consider the bathing-suit industry so sound that price is not the major point in buying. Unquestionably the cut will bring a certain amount of additional business to those who follow it, but at present writing, there are no signs of a rush of bathing-suit producers to reduce the prices set at the opening of their lines. The demand for 1931 bathing-suits is light but steady. Producers believe advance buying will be less pronounced this year, due to the general trend toward extremely low inventories; the first future covering was encouraging, but no big orders are looked for for some time.

Fancy sweaters are in good call, and the trade is optimistic at this end. The National Knitted Outerwear Association has sent out a broadside urging sweater mills to capitalize the miniature golf boom in selling sweaters. Knitters are much interested in the idea, though whether they will exploit it actively remains to be seen.

Heavyweight sweaters are moving, but orders all are small; however, the quantity of business placed is bringing cheer to the mills. Pullovers and coat models are selling equally well. Reports from road men state that retailers have reduced stocks to the point where they are finding themselves compelled to buy. Continued warm weather has served as a brake on buying, and once cold weather sets in a sharp increase in contracts is looked for.

Knitted Underwear Active

Lighter Weights in Good Call; Winter Lines Improve

THE persistent policy of retailers in running sub-normal inventories has finally forced active buying of knitted underwear. Heavyweight underwear lines are moving moderately well; the bulk of current interest, however, centers on medium and lightweight goods. Mills note a good spot call for rayons and nainsooks; all orders are small, but both jobbers and retailers have more confidence in reordering.

Salesmen now on the road are sending in good lightweight contracts, and they are optimistic as to outlook for remainder of the year. Buying continues behind, and stores refuse to place holiday business; mill men see this policy as predicating a possible jam in early November, when the need for Christmas stock begins to make itself felt. Distributors are hesitant regarding the Christmas prospects, and are putting off coverage until the last minute.

Rayon underwear activity is the one bright spot on the horizon at present. Some rayon lines are selling at normal pressure, some are even above the figures for last year at this time. The rayon yarn price cut did much to spur buyer interest in rayons, though it has meant hard sledding for the smaller knitters. There were reports in the market this week that certain small mills were at the point of liquidation. Some of the larger mills are producing as low-range numbers, the same lines that were the high-range numbers of the small mills, bringing a competition that the small mills have considerable difficulty in meeting.

The attitude of the market as a whole is that elimination of some of the mills which have been producing great quantities of inferior quality rayon underwear and underselling the trade, would be a helpful development.

The spring openings have brought little buying so far; retailers are hesitant even about immediate needs, and the knitters do not look for any sizeable spring business for some time.

◆ Broadsilk Fabrics Selling Spottily

BROADSILK fabrics are selling spottily, with cutters less interested than they were a couple of weeks ago. The unusually warm September weather has made the garment trade hesitant as to prospects for turnover on their fall lines, and they are cautious about fabric contracts. Cantons are the exception to the rule. The recent break in price appears to have steadied cantons temporarily, at least, and mills are doing a good business in this line. Weighted fabrics at $1.50 and pure dyes at $2.00 are in steady call. There is still some underselling, but mills are making a concerted effort to hold to list; prices on all lines are a shade firmer than last week. Canton stocks are moderate, with considerable gray goods on hand, but little finished stocks. Several mills are short of black canton, which is running strong.

Cutters and retailers both are more confident. Retailers have not gotten over what some mill men term their "low inventory complex" and they are limiting their fabric offerings to surprisingly few numbers. However, retail movement of piece goods is improving, and some increase in demand for fabrics is looked for by weavers.

The long-talked-of pick-up is slow in coming. The market tone is better, but mills do not look for great improvement along a wide front. The prospects for Christmas are uncertain; several sales managers of broadsilk houses said this week they did not look for a banner holiday business.

Winter resort prints are moving, and sampling has been satisfactory. There is interest in crepe-de-chine, flat crepe, cantons and some chiffons. Spring lines will open early in October, and cutters are inclined to hold back, to see what these openings bring forth in original designs. Metals appear to be definitely out of it, this year; demand has been consistently sluggish. Heavy velvets are selling for coat and suit manufacture. Transparents are a good proposition, but only in the popular-price class.

Continued Improvement in Cottons

Broader Market Brings Out Strength in Many Lines

THE rise of one-half cent in percales, made by corporation printers last week, may be taken as a sign of the times in cotton piece goods. It means, for one thing, that the steadily growing resistance among mills regarding prices has finally come to a head. The buyers are about to realize, if they have not already found out, that from now on it will be more difficult to do business in the way they did during the first part of the year. They will have to anticipate a portion of their needs rather than fill in stocks from week to week. The heavy curtailment of the summer has had an appreciable effect on deliveries, and with the move towards cutting down night work, there is no likelihood that better times will cause production to get out of hand as it has in the past.

Marked improvement is noted in several lines. Print cloths have been outstanding, followed closely by carded broadcloths. Sheeting sales have improved, but sellers believe that this is no more than a seasonal influence. This is not the case in the print cloths and broadcloths, according to mill men, as here the demand has gone far beyond any purely seasonal call.

All of the staple print cloth constructions shared in the activity, with the 80 squares outstanding; this is a reflection of the exceptional percale business of the last couple of weeks. As prices have improved, there is a greater disposition to sell advanced deliveries, which generally means to the end of the year. The 64x60, 5.35 yd., can be had at 5½c. on contracts, but many are holding for ⅛c. better for futures. The 60x48s, which are on a better poundage basis at 5c., are selling for the balance of the year at that price.

Sellers feel more satisfied than they have for months, and show marked confidence in the future. With percales showing the way, it is expected that there will be a good upturn in finished goods in the near future.

◆ American Woolen Showing Spring Line

MANY important wool goods openings have taken place in the last few days. The American Woolen Co. announced at the beginning of the week that spring styles were on display. The company did not make its prices known, although it is understood that they are 7½-15c. lower than last fall on similar numbers. This is in line with the general market where fabrics show reductions of 10-20c. on the majority of cloths, and 20-25c. on the higher grades.

Openings have been quieter and not so hectic as they were a year ago, which has been a source of relief to both buyers and sellers.

So far, the results for the spring season have been disappointing. Many of the larger manufacturers have placed fair-sized business, but the bulk of the market has yet to show a pronounced buying tendency. The current week is not expected to show much due to the Jewish holidays on Tuesday and Wednesday.

The holiday influence makes it hard to gage conditions in the women's wear market, but it is believed that the status is unchanged.

QUOTATIONS

at close of business, Sept. 24, 1930
Prices cover average qualities unless otherwise stated

Cotton Goods

	Sept. 24	Sept. 17	Sept. 25 1929
PRINT CLOTHS			
27 -in., 64x60, 7.60	4½c.	4½c.	5½-5⅝c.
38½-in., 64x60, 5.35	5½c.	5½-5⅝c.	7⅞-7½c.
39 -in., 68x72, 4.75	6½c.	6 -6½c.	8⅜c.
39 -in., 72x76, 4.25	6¾-6½c.	6⅜-6⅝c.	9⅛c.
39 -in., 80x80, 4.00	7½c.	7¼-7⅜c.	10⅛c.
BROWN SHEETINGS			
36-in., 56x60, 4.00	6½c.	6½c.	8⅛c.
36-in., 48x48, 3.00	7½-7½c.	7¼-7⅜c.	10⅛c.
37-in., 48x48, 4.00	5¾-5⅞c.	5⅞c.	8⅛c.
PAJAMA CHECKS			
36½-in., 72x80, 4.70	6c.	6c.	9⅛c.
36½-in., 64x60, 5.75	5c.	5c.	7⅞c.
MISCELLANEOUS			
Drills, 37-in., 3 yd	7⅛c.	7⅛c.	10⅛c.
Denims, 2.20	12⅛c.	12⅛c.	16.33c.
Tickings, 8 oz	16 c.	16 c.	20-21c.
Standard prints	8 c.	8 c.	9⅛c.
Eastern staple ginghams, 27-in	10 c.	10 c.	10 c

Cotton Waste

Peeler comber	9 — 9½
Peeler strips	8 — 8½
Sak. comber	8 — 8½
Choice willowed fly	4½— 5½
Choice willowed picker	3 — 4½
Sak. strips	10½—11
Linters (mill run)	2½— 3½
White spooler (single)	8 — 8½

Cotton Yarn

(Carded yarn quotations are nominal)

CARDED (Average Quality)

Double Carded 2c.-4c. higher according to quality

SINGLE SKEINS OR TUBES (Warp Twist)

4s to 8s	$0.20 - .20½	22s	$0.23 - .23½
10s	- .21	24s	.24½- .25
12s	.21 - .21½	26s	.25½- .26
14s	.21½- .22	30s	.27½- .28
20s	.22 - .22½	40s ex.qual.	.39 - .40

TWO-PLY SKEINS AND TUBES

8s-2	$0.20½- .21	26s-2	$0.26½- .27
10s-2	- .21	30s-2	.27½- .28
12s-2	.21½- .22	36s-2	.34 - .35
14s-2	.22 - .22½	40s-2	.35 - .36
16s-2	- .22½	40s-2 hi. blk.	.39 - .40
20s-2	.22½- .23	50s-2	- .45
24s-2	.25 - .26	60s-2	.53 - .54

SINGLE WARP

10s	$0.20½	24s	$0.25
12s	- .21	26s	- .26
14s	- .21½	30s	.27½- .28
16s	- .22	40s ex. qual.	.40 - .41
20s	- .22½		

TWO-PLY WARPS

8s-2	$0.21 - .21½	24s-2	$0.25½- .26
10s-2	.21½- .22	26s-2	.26½- .27
12s-2	.22 - .22½	30s-2	.27½- .28
14s-2	- .22½	40s-2 ordin.	.36 - .36½
16s-2	.22½- .23	50s-2	- .46
20s-2	.22½- .23	60s-2	- .54

8s-3 and 4-ply skeins and tubes; tinged, 17½-18; write, 19½-20; waste 16½-17

HOSIERY CONES (Frame Spun)

8s	$0.20 - .20½	22s	$0.23½- .24
10s	- .20½	24s	.24½- .25
12s	- .21	26s	.25½- .26
14s	- .21½	30s tying	.27½- .28
16s	- .22	30s reg	- .29
18s	- .22½	30s ex. qual.	- .31½
20s	- .23	40s	.36 - .37

COMBED PEELER (Average Quality)

TWO-PLY—(Knitting Twist) Cones

20s-2	$0.35½- .36	60s-2	$0.55½- .56
30s-2	.40½- .41	70s-2	.65 - .66
36s-2	.41½- .42	80s-2	.77½- .78
40s-2	.43½- .44	90s-2	.92 - .95
50s-2	.48½- .49	100s-2	1.15 -1.18

WARPS, SKEINS AND CONES

TWO-PLY—(Warp Twist)

20s-2	$0.36 - .37	60s-2	$0.56 - .57
30s-2	.41 - .42	70s-2	.66 - .67
36s-2	.42 - .43	80s-2	.77½- .78
40s-2	.44 - .45	90s-2	.97 -1.00
50s-2	.49 - .50	100s-2	1.20 -1.25

SINGLES

12s	$0.29½	30s	$0.39 - .39½
14s	- .30	38s	- .42
16s	- .30½	40s	- .43
18s	- .31	50s	.48 - .49
20s	- .32	60s	.54½- .55
24s	- .34½	70s	.64 - .65
28s	.37½- .38	80s	.77 - .78

MERCERIZED CONES—(Combed, Ungassed)

26s-2	$0.52 - .53	90s-2	$1.31 -1.33
30s-2	.54 - .55	100s-2	1.61 -1.63
36s-2	.57 - .58	120s-2	2.01 -2.04
40s-2	.60 - .61	30s	.65 - .67
45s-2	.62 - .64	40s	.70 - .72
50s-2	.64 - .66	50s	.77 - .79
60s-2	.72 - .74	60s	.85 - .87
70s-2	.84 - .86	70s	.97 - .99
80s-2	.96 -1.01	80s	1.19 -1.21

Cotton Prices and Statistics

COTTON STATISTICAL DATA

(Fluctuations of Futures)

	Closed Sept. 18	—For Week— High	Low	Closed Sept. 24	Net Chge.
September	10.84	10.84	10.50	10.50	—.34
October	10.95	11.07	10.52	10.54	—.41
November	11.04	11.04	10.70	10.70	—.34
December	11.17	11.28	10.85	10.88	—.29
January	11.26	11.28	10.95	10.96	—.30
February	11.28	11.28	10.95	10.95	—.33
March	11.37	11.52	11.03	11.05	—.32
April	11.45	11.45	11.13	11.13	—.32
May	11.54	11.68	11.21	11.25	—.29
June	11.63	11.63	11.30	11.31	—.32
July	11.72	11.83	11.37	11.39	—.33

SPOT FLUCTUATIONS FOR WEEK

(Middling)

	New York	New Orleans	Liverpool
Friday, Sept. 19	10.90	10.65	....
Saturday, Sept. 20	10.85	10.60	6.19
Monday, Sept. 22	10.75	10.45	6.20
Tuesday, Sept. 23	10.65	10.40	6.05
Wednesday, Sept. 24	10.55	10.34	5.98
Thursday, Sept. 25	10.55	10.16	5.98

SPOT FLUCTUATIONS AND STOCKS

Markets	Sept. 17	Sept. 24	Sales	Stocks This Week	Stocks Last Year
Galveston	10.90	10.55	4,411	275,906	178,163
New Orleans	10.71	10.34	56,266	382,123	177,807
Mobile	10.10	9.95	12,976	56,215	34,597
Savannah	10.44	10.08	12,565	233,101	104,729
Norfolk	10.94	10.50	1,728	47,504	14,983
New York	11.00	10.55	3,200	233,011	100,932
Augusta	10.31	9.94	4,732	91,019	60,393
Memphis	9.90	9.50	25,247	153,392	93,272
St. Louis	9.85	9.75		1,601	4,795
Houston	10.85	10.45	111,138	859,138	330,382
Dallas	10.25	9.90	102,857	14,134	2,595

BASIS MIDDLING

	Saturday, Sept. 20	Saturday, Sept. 13
10 markets average	10.27	10.32
Memphis	9.75	9.85

PREMIUM STAPLES

First Sales from Factors Tables at Memphis

Grade Strict Middling	Prices Barely Steady
1⅛-in	12.00—12.25c.
1 3/16-in	13.75—14.00c.
1¼-in	18.75—19.00c.

CURRENT SALES

	For Week	Prev. Week	Week Before
Memphis total	11,640	8,768	3,179
F.o.b. included in total	11,281	7,480	3,169
10 markets	241,609	196,182	128,292

MEMPHIS RECEIPTS, SHIPMENTS, ETC.

	For Week	Last Year	Year Before
Net receipts	12,695	26,617	12,623
Gross receipts	18,722	42,186	22,846
Total since Aug. 1, net	23,132	40,060	18,754
Shipments	11,122	19,815	14,242
Total since Aug. 1	68,536	73,183	72,759
Total stock	138,705	56,823	62,837
Increase for week	7,690	31,404	28,603
Unsold stock in hands of Memphis factors	31,364	17,168	.....
Increase for week	4,776	10,754	.....

AVERAGE PRICE OCTOBER SHIPMENT HARD WESTERN COTTON

F. o. b. New England

	Middling	St. Middling
1 1/16 in	12½-13½c.	13½-13½c.
1⅛ in	14 -14½c.	14½-15 c.
1 3/16 in	16 -17 c.	17 -18 c.
1¼ in	20 -21 c.	22 -23 c.

Basis on New York, New December, 10.75c.

DIFFERENCES ON AND OFF MIDDLING WHITE GRADES

	Dallas	Memphis	Montgomery	Augusta	Average
M.F	1.05†	1.00†	1.00†	1.00†	0.87†
S.G.M	.90†	.85†	.90†	.88†	.71†
G.M	.75†	.75†	.75†	.75†	.52†
S.M	.50†	.50†	.50†	.50†	.32†
S.L.M	.75*	.65*	.65*	.75*	.70*
L.M	1.75*	1.75*	1.50*	2.00*	1.73*
S.G.O.**	3.00*	2.75*	2.50*	3.25*	2.85*
G.O	3.00*	2.75*	2.50*	3.25*	3.88*
YELLOW TINGED					
G.M	0.50*	0.25*	0.50*	0.50*	0.58*
S.M	1.00*	.75*	1.00*	1.00*	1.05*
M.**	1.75*	1.25*	1.50*	1.50*	1.68*
S.L.M	2.50*	1.75*	2.25*	2.25*	2.37*
L.M.**	3.50*	2.25*	3.00*	3.00*	3.30*
YELLOW STAINED					
G.M	1.50*	1.75*	1.50*	1.50*	1.58*
S.M.**	2.25*	2.50*	2.50*	2.50*	2.40*
M.**	3.00*	3.00*	3.50*	3.50*	3.23
BLUE STAINED					
M.G.**	1.75*	1.50*	1.75*	1.75*	1.78*
S.M.**	2.25*	2.25*	2.75*	2.75*	2.50*
M.**	3.00*	2.75*	3.75*	3.75*	3.28*

**Grades not deliverable on contract. †On Middling *Off Middling.

EGYPTIAN COTTON

Alexandria Exchange, Sept. 10		Change
November Sak	19.17	—0.55
October uppers	12.68	—0.50

SEPT.-OCT. SHIPMENT c. i. f. BOSTON

(Tariff not included)	(Prices Nominal)
Fully good fair Sak	23.35
Fully good fair to good Uppers	16.10

(By Anderson, Clayton & Co.)

Wool

OHIO, PENNSYLVANIA AND WEST VIRGINIA (IN GREASE)

Fine delne..	$0.31 –$0.31½	¾ blood.....	$0.29 –$0.30
Fine clthg..	.23 – .24	¼ blood.....	.30 – .31
½ blood.....	.30 – .30		

TEXAS AND CALIFORNIA (CLEAN BASIS)

Texas, 12 months	$0.73 –$0.75
California, Northern	.65 – .68

PULLED—EASTERN (CLEAN BASIS)

A.A	$0.77 –$0.80	B-Super	$0.50 –$0.60
A-Super	.65 – .68	C-Super	.48 – .52

MONTANA, IDAHO AND WYOMING (CLEAN BASIS)

Staple fine	$0.75 –$0.78
Staple ½ bld.	.70 – .73
Fine and fine medium	.70 – .72
⅝ blood	.60 – .63
½ blood	.56 – .58

MOHAIR—DOMESTIC

Best Carding	$0.35 –$0.38
Best combing	.50 – .52

MOHAIR FOREIGN (IN BOND)

Turkey fair, average	$0.25 –$0.28
Cape firsts	.25 – .28

FOREIGN CLOTHING AND COMBING (CLEAN BASIS IN BOND)

Australia:	
70s	$0.65 –$0.70
64s	.53 – .55
58s-60s	.46 – .48

(IN GREASE)

Montevideo:	
58s-60s	$0.25 –$0.26
56s	.25 – .26
50s	.23 – .24
Buenos Aires:	
4s, 40-44s	$0.22 –$0.23
5s, 36-40s	.20 – .21

FOREIGN CARPET (GREASE BASIS IN BOND) SCOURED

Aleppo	$0.28 –$0.29
China: Combing No. 1	.16 – .17
China Filling Fleece	.15 – .16
Szechuen ass't	.15
Cordova	.15 – .16
Scotch black face	.19 – .20
East India: Kandahar	.23 – .24
Vican'r	.27 – .28
Joria	.27 – .29

Worsted Yarns

ENGLISH SYSTEM WEAVING

2-20s, 36s	$0.92½–$0.95
2-24s, 40s	1.02½– 1.05
2-26s, 44s	1.10 – 1.12½
2-28s, 46s	1.15 – 1.17½
2-30s, 48s	1.20 – 1.22½
2-32s, 50s	1.25 – 1.27½

(Single yarns 5c. less than above)

2-36s, 58s	$1.35 –$1.40
2-40s, 60s	1.45 – 1.47½
2-40s, 64s	1.50 – 1.52½
2-50s, 66s	1.67½– 1.72½
2-60s, 70s	2.05 – 2.10

ENGLISH SYSTEM KNITTING

2-20s, 44s in oil		$0.95
2-20s, 48s in oil	1.00 –	1.02½
2-20s, 50s in oil		1.05
2-20s, 56s in oil		1.15
2-20s, 60s in oil		1.30
2-20s, 64s in oil	1.35	1.37½
1-15s, 46s dyed	1.15 –	1.17½
1-15s, 48s dyed	1.17½–	1.20
1-15s, 50s dyed	1.20 –	1.22½

(Oil yarns 17½c. less)

FRENCH SYSTEM

1-20s, 58s	$1.17½–$1.20
1-20s, 60s	1.25 – 1.27½
1-18s, 64s, Dyed	1.52½
1-26s, 64s	1.27½– 1.30
1-30s, 60s, Warp	1.40 – 1.42½
1-30s, 64s, Warp	1.42½– 1.45
2-30s, 64s, Fancy mixes	1.70 – 1.72½
2-40s, 64s, Zephyrs	1.60 – 1.65
1-50s, 66s	1.62½– 1.65
2-50s, 66s	1.80 – 1.82½
1-60s, 70s	1.95 – 2.00
2-60s, 70s	2.10 – 2.15

FRENCH SPUN MERINO WHITE

1-30s, 50-50-58s on cops	$1.05 –$1.07½
1-40s, 50-50-60s on cops	1.20 – 1.25
1-40s, 50-50-64s on cops	1.22½– 1.25
1-40s, 50-50-64s Australian cops	1.25 – 1.30

Underwear mixes, 3c. additional.
Solid color, 35c. additional.

◆

Tops and Noils

TOPS—BOSTON

Fine (64-66s)	$0.98–$1.00
Half-blood (60-62s)	.88– .92
High ¾ blood (58s)	.83– .85
Aver. ¾ blood (56s)	.80– .83
Low ¾ blood	.73– .78
High ½ blood (50s)	.70– .72
46s S. A. and N. Z.	.65– .66
44s S. A. and N. Z.	.62– .65
40s S. A. and N. Z.	.58– .60

TOPS—BRADFORD, ENG. (SEPT. 19)

Fine (70s)	31 d	¾ bld. (56s)	19d
Fine (64s)	28 d	⅝ bld. (50s)	16d
½ bld. (60s)	25½d	Cross-bred (46s)	14d
⅜ bld. low (58s)	21½d		

NOILS—BOSTON

Fine	$0.55–$0.58	High ½ bld.	$0.42–$0.45
Half-bld	.50– .53	Low noils	.35– .40
Aver. ¾ bld.	.45– .48	Medium colored	.35– .40
Fine colored	.44– .47		

Wool Substitutes

WOOL WASTE

Lap, fine white	$0.73 –$0.75
Lap, fine colored	.56 – .58
Hard ends, fine white	.60 – .62
Hard ends, ½ blood white	.40 – .43
Hard ends, fine colored	.25 – .28
Hard ends, medium colored	.20 – .22
Card, fine white	.30 – .32
Burr, fine Carbonizing	.38 – .40

OLD WOOLEN RAGS (GRADED FOR MFRS.)

Merinos, Coarse Light	$0.06 –$0.07
Merinos, Fine Dark	.04½– .05
Merinos, Fine Light	.14 – .14½
Serges, Blue	.07½– .08
Serges, Black	.07 – .08
Serges, Red	.11 – .11½
Knit, White	.29 – .30
Knit, red	.15 – .16
Knit, Light Hoods	.14 – .15
Worsted, Light	.05½– .06
Worsted, Blue	.07½– .08
Worsted, Black	.07½– .08

Silk Yarns

THROWN SILK (60 day basis)

	Nominal
Japan organzine, 2thd. grand XX in skeins	$4.40
Japan organzine, 2 thd. sp. crack in skeins	4.20
Japan crepe, 3 thd. grand XX in bobbins	4.40
Japan crepe, 3 thd. sp. crack on bobbins	4.10
Japan crepe, 4 thd. crack on bobbins	3.90
Canton crepe, 3 and 4 thd. ns. 14/16 on bobbins	2.82½
Tussah tram, 2 end on cops	2.10
Hosiery tram, 3 thd. Japan 90%	5.10
Hosiery tram, 4 thd. Japan, 88%	4.55
Hosiery tram, 5 thd. Japan, 85%	4.10
Hosiery tram, spec. crack XX	3.75
Hosiery tram, crack XX	3.55

SPUN SILK YARNS (Terms: net 30)

40/2	$3.45	60/2	$3.80
50/2	3.65	62/1	2.80

Raw Silk

(60 day basis)
Prices Nominal

	13/15 White	20/22 White	20/22 Yellow
Super Grand, 86/88%	$3.50	$2.80	$2.75
Special Grand, 85%	3.20	2.80	2.75
Grand XX, 83%	2.90	2.70	2.65
Special Crack, 81%	2.80	2.65	2.50
Crack XX, 78%	2.75	2.60	2.45
Extra Extra, 73%	2.60	2.55	2.40
Best Extra, 68%	2.50	2.50	2.35

Canton filature, new style, 14/16	$1.80
Canton filature, new style, 20/22	1.65
Tussah filature, 8 cocoon	1.45

NATIONAL RAW SILK EXCHANGE

	Close Sept. 17	For the Week High	Low	Close Sept. 23	Net Chge.
September	2.70	2.70	2.61	2.62	—.08
October	2.63	2.63	2.52	2.55	—.08
November	2.60	2.60	2.50	2.53	—.07
December	2.60	2.60	2.51	2.51	—.09
January	2.60	2.60	2.50	2.50	—.10
February	2.60	2.60	2.52	2.53	—.07
March	2.60	2.60	2.51	2.51	—.09
April	2.60	2.60	2.51	2.51	—.09

Sept. 17 to Sept. 23—Total contracts, 370. Total number of bales, 3,700. Total approximate value, $1,102,500.

Domestic Rayon

VISCOSE PROCESS

Denier	Filament	First	Second
50	14	$2.15	$1.95
75	18	1.60	1.50
75	30	1.70	1.60
100	18	1.25	1.15
100	40	1.30	1.20
125	36–50	1.20	1.10
150	24–30	.95	.90
150	36–40	1.00	.95
150	60	1.15	1.10
150	75–90	1.20	1.15
170	24–27	.95	.90
170	60	1.15	1.10
200	30	.90	.85
200	35–40	.90	.85
200	75–80	1.10	1.05
300	44–60	.78	.75
450	54–60	.78	.75
600	72–96	.78	.75
900	100–144	.78	.75

NITRO-CELLULOSE PROCESS

Denier	First Qual.	Second Qual.	Denier	First Qual.	Second Qual.
75	$1.60	$1.50	150	$0.95	$0.90
100	1.25	1.15	175	.95	.90
125	1.20	1.10			

CUPRAMMONIUM PROCESS

Denier	Filament	Price	Denier	Filament	Price
15	24	$3.10	65	45	$2.00
25	24	2.85	80	60	1.70
30	24	2.60	100	75	1.40
40	30	2.40	120	90	1.30
52	30	2.20	150	112	1.25
			180	135	1.10

ACETATE PROCESS

Denier	Price	Denier	Price
45	$2.25 2.75	120	$1.90
55	2.05–2.55	140	1.30
65	2.45	150	1.40–1.85
75	1.80–2.70	200	1.55
100	1.65–2.45	300	1.50

Rayon Waste

Prices Nominal

Open bleached waste	–$0.15
Open unbleached waste	–.13
Bleached thread waste (mfs.)	–.11
Bleached thread waste (misc.)	–.09
Colored thread waste	–.08
Colored clips	–.07

CONVERTED RAYON WASTE

Bleached tops	–$0.46
Unbleached tops	–.42
Bleached noils	–.15
Bleached garnetts	–.14
Unbleached garnetts	–.14
Colored garnetts	–.12

Silk Waste

Kibizzo Kakai Grand XX	$0.85
Kibizzo Kakai Triple Extra	.92
Frison Grand Double	.90
Pierced Cocoons	1.12

A Multi-Use Chemical

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FORMALDEHYDE

HOFFMAN unwittingly performed a great human service when his experiment of 1867 resulted in the discovery of Formaldehyde. The Formaldehyde Solution of today is a particularly reactive material which possesses very interesting and beneficial properties.

P.A.C. FORMALDEHYDE

Formaldehyde Solution is an excellent germicide, fungicide and deodorant. As such, it enjoys wide usage in the control of wheat smuts, diseases of other grains, and treatment of seed potatoes. Hospitals and public health departments employ it as a fumigant, deodorant and medium of sterilization.

The reaction of Formaldehyde with protein to form water-resistant products is utilized in the production of synthetic tannins, the water-proofing of textile fabrics, the manufacture of casein plastics, and in treating paper.

Formaldehyde reacts with phenol, cresol, urea, etc., to produce the synthetic resins which are finding so many uses.

Formaldehyde is a raw material in the manufacture of dyes. It is also the active ingredient of embalming fluids.

In common with most aldehydes, Formaldehyde forms bisulphite compounds. It reacts directly with ammonia to produce Hexamethylenetetramine. It is a powerful reducing agent. These properties are utilized in forming useful chemical compounds for the textile and rubber trades.

Formaldehyde polymerizes under certain conditions to form Paraformaldehyde, used where the presence of water in any substantial quantity is objectionable.

R&H began producing Formaldehyde at Perth Amboy in 1903. For a number of years our product has been known to the trade as "P.A.C. Brand Formaldehyde Solution." Because of its uniformly high quality, low acidity and freedom from impurities, P.A.C. Formaldehyde is recognized as the standard.

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The ROESSLER & HASSLACHER CHEMICAL CO.
INCORPORATED
10 East Fortieth Street
New York, N. Y.

Another Move Toward "Vegetable" Wool

Interests connected with a Canadian organization known as Bast Fibers, Inc., have rented the Silesia Mills, lately idle and formerly operated by the U. S. Worsted Corp., at North Chelmsford, Mass. They are understood to be at work on preparation of a wool substitute. The raw material is said to be china grass, or ramie. Similar efforts have been made many times in the past with interesting but inconclusive results, as reported in these columns from time to time. This particular firm is said to have excellent financial backing in support by John J. Raskob, financier and prominent Democrat, whose son is said to be guiding the firm's development work. William T. Picken is manager of the office force at the mills.

New Philadelphia Wool House

Albert H. Fey, formerly head of wool firm Albert H. Fey & Co., 106 Chestnut St., Philadelphia, and Fulton Farrell, formerly partner in Farrell & Romero, 114 Chestnut St., have severed their connections with these concerns and have formed a company that will trade as Fey, Farrell & Co., at 210 Chestnut St., engaging in an import and export business in wool and sheepskins. The firm of Albert H. Fey & Co., will discontinue business upon formation of the new concern. Mr. Farrell will represent them in South American markets.

Chittick Textile Courses Begin Next Week

James Chittick, consulting textile specialist, will give an evening course in textiles at Columbia University, New York, beginning Monday, Sept. 29, 7:30 to 9:30 p.m. The course will comprise fifteen sessions, held each Monday evening, and will cover silk, rayon, ribbons and pile fabrics. On Tuesday evening, Sept. 30, Mr. Chittick will resume his own evening class of textile instruction, now in its fifteenth year, at 45 East 17th St.; this class meets each Tuesday evening, 6 to 8 p.m., totalling sixteen sessions and will cover practically all textile divisions, including silk, cotton, linen, wool, mohair, rayon, spun silk, and dealing with all aspects of production and fabric analysis.

Courtaulds, Canada, Enlarges

The New York rayon market is inclined to see a reaction to the new protective Canadian tariff, in the reports from Cornwall, Ont., that the rayon plant there of Courtaulds, Ltd., is being enlarged to permit a one-third increase in yarn output.

Obituary

Francis S. North

Francis Stanley North, president of the Union Special Machine Co. and a resident of Lake Forest, Ill., died on Sept. 9, at Boston, Mass., following a long illness. Mr. North was born in Chicago in 1875, the son of William Stanley North, the founder of the Union Special Machine Co. After attending the Chicago Manual Training School and the Phillips Andover Academy he went to Yale University and was graduated as a mechanical engineer in 1897. After three years' experience as an apprentice in the Cramps Ship Yards in the department of engine construction he returned to Chicago to enter the employ of the Union Special Machine Co. Mr. North held various positions in the organization and was particularly instrumental in establishing foreign branch offices. He was elected a director of the company in 1904, treasurer in 1909, president in 1913.

Richard G. Riley

Richard G. Riley, divisional manager in charge of the King Philip and Parker Mill units of the Berkshire Fine Spinning Association, Inc., died suddenly at his home in Fall River, Mass., Sept. 23. He was previously associated with the King Philip Mills as superintendent for a period extending over 15 years.

Textiles on N. Y. Exchanges

The following shows the movements of the leading textile stocks listed on the New York Stock Exchange and Curb for the week ended Sept. 24:

	High	Low	Last Sale	Net Change
Adams Millis	25½	25½	25½	— 1½
American Woolen	11	10	10⅝	— ⅜
American Woolen, pfd	28½	26	26½	— 1½
*Assoc. Rayon, pfd	50½	46½	47½	— 3¼
Belding-Hemingway	4¼	3⅝	4	....
*Bleumenthal	20½	20½	20½	+ ¼
Botany Mills, A	3	2½	2½	+ ⅛
Cannon Mills	21⅝	20½	20½	— 2⅛
Century Ribbon	5½	4¼	4½	— 1¼
Collins & Aikman	21	17	17	— 4¼
Consolidated Textile	⅞	⅞	⅞	....
Duplan Silk	18	18	18	....
*Fabrics Finishing	2⅜	2¼	2¼	— ⅛
Gotham Hosiery	12¼	11	11¼	— 1
Industrial Rayon	81	78½	78½	— 7
Kayser, Julius	24½	23	23	— 2½
Mallinson	6⅜	6½	6½	—
Mohawk Carpet	18½	17½	17½	— 1½
Munsingwear	39	39	39	....
Pacific Mills	22	21½	21½	— ½
Real Silk Hosiery	47¼	42⅝	44⅞	+ ⅜
*Tubize Chat. B	7	6	6⅜	— ⅛
United Piece Dye Works	25½	24½	24½	— 1

*Listed on Curb.

Naumkeag Program of Research

Further evidence of a more extensive program of research on the part of leading New England mills is seen in the creation of a new laboratory at Danvers Bleachery of the Naumkeag Steam Cotton Co., Peabody, Mass.

Ernest N. Hood, treasurer of the company, who is vice-president of the recently organized United States Institute for Reasearch, has reported that his corporation is spending more than $50,000 this year on its research work in Pequot Mills, Salem and at the Bleachery.

New Tubize-Chatillon List

The complete new price list of Tubize-Chatillon Corp., on five types of rayon yarn made by three processes, and including the division of nitrocellulose yarns into three grades is as follows:

(TUBIZE Lustrous)
Nitro-Cellulose Process

Den.	Fil.	Skeins 1st	Skeins 2d	Skeins 3d	Cones
50	12	$1.95	$1.80	$1.65	....
75	18	1.60	1.5[illegible]	1.40	....
100	26	1.25	1.1[illegible]	1.05	1.30
125	25	1.10	1.00	.90	1.15
150	30	.95	.90	.85	.98
175	30	.95	.90	.85	....

SANCONIZE (Semi-Lustrous)
Nitro-Cellulose Process

Den.	Fil.	Skeins 1st	Skeins 2d	Skeins 3d	Cones
125	30	$1.18	$1.08	$0.98	$1.23
150	36	.98	.93	.88	1.01

CHARDONIZE (Dull Lustre)
Nitro-Cellulose Process

Den.	Fil.	Skeins 1st	Skeins 2d	Skeins 3d	Cones
100	26	$1.30	$1.20	$1.10	$1.35
125	30	1.23	1.13	1.03	1.28
150	36	1.03	.98	.93	1.06

CHACELON
Acetate Process (First Quality Only)

Den.	Fil.	Skeins and Spools	Cones Nat.	Cones Tint
45	13	$2.25	....	....
55	13	2.05	....	....
75	20	1.80	....	....
100	26	1.65	1.75	1.80
150	40	1.30	1.40	1.45

Note: 2½ and 5 turns twist, same price—Ten cents per pound additional over skein prices for 5-inch and 6-inch cops, excepting 150 Dr.—5c.

SUNBEAM (Lustrous)
Viscose Process

Den.	Fil.	Skeins 1st	Skeins 2d	Cones 1st	Cones 2d
100	40	$1.30	$1.20	$1.35	$1.25
150	40	.95	.90	.98	.93

Textile Calendar

Carolina Yarn Association, Golf tournament, Sedgefield, near Greensboro, N. C., Sept. 26 and 27, 1930.

National Safety Congress, Textile Section, Annual Meeting, William Penn Hotel, Pittsburgh, Pa., Sept. 30-Oct. 1, 1930.

Master Mechanics' Division, Southern Textile Association, Regular meeting, Greensboro, N. C., Oct. 3, 1930.

National Association of Cotton Manufacturers, Annual Meeting, Poland Springs, Me., Oct. 10-11, 1930.

Committee D-13, American Society for Testing Materials, Fall Meeting, Hotel Kenmore, Boston, Mass., Oct. 16-17, 1930.

Ninth Southern Textile Exposition, Textile Hall, Greenville, S. C., Oct. 20-25, 1930.

Textile Division, A.S.M.E., National Meeting, Poinsett Hotel, Greenville, S. C., Oct. 22, 1930.

Southern Textile Association, Semi-Annual Meeting, Poinsett Hotel, Greenville, S. C., Oct. 24, 1930.

United States Institute for Textile Research, First Annual Meeting, New York City, Nov. 6, 1930.

The Textile Forum, N.A.C.M., overseers of carding, Boston (Mass.) Chamber of Commerce, Nov. 18, 1930.

Ninth National Exposition of Power and Mechanical Engineering, Grand Central Palace, New York City, Dec. 1 to 6, 1930.

The Textile Forum, N.A.C.M., overseers of spinning, Boston (Mass.) Chamber of Commerce, Dec. 9, 1930.

The Textile Forum, N.A.C.M., master mechanics, Boston (Mass.) Chamber of Commerce, Jan. 13, 1931.

The Textile Forum, N.A.C.M., warp preparation and weaving, Boston (Mass.) Chamber of Commerce, Feb. 10, 1931.

The Textile Forum, N.A.C.M., overseers of finishing, Boston (Mass.) Chamber of Commerce, March 10, 1931.

Georgia Mill Men Hold Fall Meeting

(Continued from page 143)

used in his plant. Each week part of the loom is inspected by the second hands on a written order specifying what parts are to be examined. When repairs are found necessary, a report is made and the loom fixer receives instructions to have the trouble eliminated.

In another mill it was reported that looms are inspected daily by the second hands in each department and by the loom fixer once each week. Edward J. Barry, overseer weaving, Eagle & Phenix Mills, Columbus, Ga., found it advisable to have looms inspected while warps are out, as it is much easier to examine cams, bearings and certain other parts at that time. Warps run out about every two weeks.

One member estimated that about 30% of all loom stops were from causes originating outside the weave room. Mr. Cooper reported that an average of several nine-hour tests revealed that 81% of all loom stops were due to other reasons than mechanical trouble in weaving.

The best method for drawing selvages on plain broadcloth, according to Mr. Barry, is a single end through the eye and two ends through the dent for 12 dents. He also suggested that a three-inch strip of sandpaper be placed on the outside edge of the perforated roll.

Several members felt that the best way to handle loose ends is to wind them around the beam. Mr. Barnes suggested that as many as three loose ends might be added in the selvage.

Mr. Barnes also stated that his mill obtained an increase in production when pick counters were installed as the weavers could see exactly what they were doing. When loom production was determined by measuring cuts, he said, a weaver might have to wait until the warps ran out before receiving his compensation.

Pick counters serve as inspiration for weavers to increase production, according to Mr. Elliott, who pointed out that the overseer could also detect if any particular looms had been stopped excessively, or if a belt were slipping and cutting down the speed of a loom. It was said to be advisable to have one man check the pick counters daily and another to check them weekly.

Operating 1,414 looms, all equipped with counters, Mr. McAlister found that it was necessary to replace only about six or seven counters annually.

Following the luncheon, when it was announced that Mr. Petrea had been elected general chairman for the ensuing year, the secretary performed the usual ceremony of drawing the lucky ticket for the winner of a $10 hat. This time the fortunate one was George Elliott, Pacolet Mfg. Co., New Holland, Ga.

Mechanical Problems

Discussion of mechanical problems was conducted by P. L. Lindsey, general master mechanic, Thomaston (Ga.) Cotton Mills.

Experimenting with practically every well-known type of high pressure lubricating system on regular ring oiler shafting bearings, A. B. Baker, superintendent, Georgia Duck & Cordage Mill, Scottdale, Ga., reported that after 14 weeks of continuous operation satisfactory results have been obtained and indications were that they would run at least six months without further lubrication. He stated that no trouble had been experienced by grease coming out at the end of bearings but that some grease had come out around the cap.

J. C. Edwards, superintendent, Martha Mill, division of B. F. Goodrich Co., Thomaston, Ga., said that it was necessary to service ball bearings on line shafting which are lubricated with high pressure system every six months. He has found it apparently impossible to obtain a grease that will reach the outer end of long sleeve bearings, and therefore does not approve of high pressure lubrication for such bearings.

W. S. Jenkins, master mechanic, Hillside Cotton Mills, LaGrange, Ga., stated that after four years' experience with V-belt drives he was convinced that they were satisfactory where properly installed. It was reported that particularly good results were obtained on fly frames, twisters and centrifugal pumps.

Chairman Lindsey stated that installations of V-belt drives under his supervision at the present time included those from 75 hp. down to ¾ hp. motors. Good results were experienced with this type of drive, Mr. Edwards stated, and added that it is not good practice to replace only one belt at a time. If this is done, he said, most of the strain is thrown on the new rope and it will wear out much faster. It was said that some V-belt drives installed on twisters in 1924 are still in operation.

About 95% of breakage of parts is in cast iron and steel, according to Mr. Jenkins, and therefore in his shop the electric welder is used almost entirely. Mr. Cooper declared that the acetylene welder is more satisfactory but that much depends on skill of the operative. In most cases it was felt that an acetylene welder is preferable where a mill cannot have both outfits.

Mr. Edwards stressed the importance of determining just what caused the breakage. He outlined a system for checking on repair work, as follows: Three copies of the shop order accompany the job to the machine shop. The shop foreman writes on the order the cost of time and material involved in making repair. One copy of the order is retained by the master mechanic, one copy is sent to the superintendent and the third copy accompanies the job back to the proper department. The superintendent checks his copy of the order and passes it along to the accounting department. Each department has a budget for maintenance and repairs and each department head checks his copy of repair orders very carefully and takes every reasonable step to prevent repetition of trouble due to neglect.

Mr. Murphy said that once a month a list of supplies taken by each loom fixer and overseer is posted in the supply room. This enables department heads to see how they stand and serves as an incentive for them to watch maintenance costs.

It was found that the usual practice was to inspect and gage motors every three months. Mr. Wallace stated that he preferred to clean and oil motors every two weeks and to gage them every four weeks.

Several master mechanics condemned lax and unsatisfactory methods of taking care of tools belonging to the plant. Chairman Lindsey found it more satisfactory to give one man the responsibility for handling tools. Frequently this work could be combined with that of grinding, oiling and sweeping in the machine shop, if a smaller mill could not afford a full-time man.

High-pressure lubrication was said to be preferred for ball-bearing shafting and for ball-bearing motors. It was pointed out that motors will heat up if an excessive amount of grease is applied.

It was felt that line shafting should be lubricated while not in motion in order to prevent oil drips from the bearings. About every month drip pans should be placed under the shafting and the bearings cleaned out.

Centrifugal pumps were considered better than steam pumps for use in the boiler room. Although a small boiler does not justify the cost of installing a stoker, the device was preferred to hand-firing for larger units. Results were said to depend upon the grade of coal used. In one plant stoker-firing produced an evaporation of 10½ lb. of water per 1 lb. of coal, whereas hand-firing obtained only 9½ lb. Chairman Lindsey estimated that the installation of stokers in larger units might reduce coal consumption from 33% to 50%.

It was felt that some supply parts can be made in mill machine shops just as well and at a saving in cost as compared with the practice of purchasing such parts from builders. Accurate costs are necessary in determining whether making supply parts at the mill is advantageous, or not. One member declared that every part about a loom should be obtained from the loom manufacturer as it was not a satisfactory practice to make loom parts in a mill machine shop.

Army Buying Uniform Cloth

Philadelphia—Bids were opened by Army Quartermaster, Sept. 19, for five textile items, calling for 2,000 yds., Barathea, 1,000 yds., Bedford cord cloth, 2,000 yds., elastique, 5,000 yds., gabardine, 5,000 yds., whipcord cloth. Bids received were: Germania Mills, item 1, $3.19; item 4, $2.94; item 5, $3.94; Botany Worsted Mills, item 1, $3.25, item 2, $5.50, item 3, $3.475, item 4, $2.85, item 5, $4.05; Selden Worsted Mills, item 1, $3.475.

Paterson Manufacturers Endorse Silk Institute Plan

THE first formal step toward rallying the silk industry of Paterson, N. J., to support a movement for a Silk Institute in that city was taken last week when 400 persons, one half of whom were silk manufacturers, attended a series of meetings and dinners, arranged by the Paterson Chamber of Commerce. Those present filled out questionnaires giving their views on the project. The results of the questionnaire have not been made public as yet, but a preliminary scanning of the answers showed the following opinion: Out of a total of 120, 108 endorsed the institute idea, 2 were opposed and 10 failed to vote. Officials of the Chamber of Commerce believe that this proportion will represent the sentiment disclosed when the final results of the questionnaire are known. The answers now are in the hands of a committee, representing both the silk industry and the city of Paterson, and this committee will spend several weeks studying the answers, together with the stenographic records of the meetings.

Aims of Institute

The aim of the projected institute is to effect closer coordination among the silk manufacturers and finishers, the textile machinery manufacturers as a trade group, and to bring about a more direct cooperation between this group and the administrative, health and financial interests of the city of Paterson. The prospectus of the Chamber of Commerce states that the institute would: Secure the advice of the Paterson Clearing House Association and financial institutions on credits, distribution, and costs of doing business; develop methods to make Paterson silk standard throughout the country; develop technical knowledge and practice; effect better understanding on raw silk standards, construction, weighting, power, water, dyeing, taxes, etc.; and develop ways to eliminate waste and to adopt the most efficient technical methods of operation.

The question was threshed out in detail at the Alexander Hamilton Hotel, Paterson, Sept. 18. John J. Fitzgerald, secretary of the Paterson Chamber, credited with being the father of the Institute idea, arranged the day's program.

The meetings were notable for the enthusiasm manifested by both manufacturers and the citizens of Paterson as a whole. Paterson, it was felt, suffers from lack of coordination in its silk industry, from a failure to get together and exchange views. It was a flag-waving day for the city, but, beneath this civic demonstrativeness, there was an earnest feeling that union of forces in an institute would strengthen the position of Paterson's silk industry before the world. The importance of Paterson in the silk trade was revealed in figures: The city has 787 silk firms, owned by 3,000 individuals, and employing 25,000 persons whose wages average $70,000 daily.

A general meeting, attended by about 100, one-third of whom were silk manufacturers, was held in the afternoon. Labor and personnel problems in the Paterson silk mills were the chief topics of discussion. Educational officers of the city told of work done to prepare the youth of the city for jobs in the mills, and said that the younger generation preferred the metal trades to textiles because of the uncertainty of regular employment in the latter. It was urged that silk manufacturers effect closer relations with school authorities through the proposed institute, to stimulate keener interest in textiles among the students.

Diners Hear Gerli

In the evening five dinner meetings were held, divided as follows: Personnel, distribution, commercial arbitration, research, and costs and profits. These brought out a large and representative group of silk manufacturers, totaling half of those present. The silk men showed keen interest in the institute plan. Paolino Gerli, of E. Gerli & Co., speaker at the distribution meeting, made the outstanding address of the evening. He strongly supported the project, but stressed many problems which would have to be solved before such an institute could be launched successfully. Wages, restless labor, and sentimental objections to modernization of plants were the chief obstacles, he said. He emphasized the power of organization and said that through such organization the manufacturers could make the "Made in Paterson" stamp a standard for quality of merchandise and good business practice. Other speakers were Alexander D. Walker, of A. D. Walker & Co., New York City, Ernest Ruegg, of New York, Dr. Emil Roetheli, of United Piece Dye Works, Forrest S. Dayton, president of the Silk and Rayon Credit Association, R. deVere Hope, of Associated Dyeing and Printing Corp., Paterson, E. C. Rossmassler, of Sauquoit Silk Mfg. Co., New York, Isaac Coburn, secretary Paterson Broad Silk Manufacturers Association, J. Shields, Chenango Silk Co., and Thomas Eaton, of the Brilliant Silk Co., Paterson. The speakers analyzed the institute idea as regards its possible benefits to distribution, production, labor, research, and administration, and were unanimous in endorsement of the project.

Reviewing the meetings in perspective, Mr. Fitzgerald said the chief result was a strong approval of the plan. The next move lies with the executive committee. He pointed out that progress toward the establishing of the institute would be necessarily slow, but felt that the plan was definitely under way.

Union Announces Vote in Favor of Danville Strike

From Southern Office, **Textile World**

AN approaching crisis in the labor situation at Danville, Va., was indicated by the trend of affairs this week when officials of the United Textile Workers of America announced that members of the union at the Riverside & Dan River Cotton Mills had voted overwhelmingly in favor of a strike. W. R. Gaylor, representative of the Bureau of Conciliation, United States Department of Labor, sought to arbitrate alleged differences between the union and the mill management. Although officials of the union claim that the local has a membership of 4,000 Danville textile workers, more conservative estimates place the number of union members at much less than 3,000.

Among the charges brought against the mill management is the employment of the so-called "stretch out" system, whereas it is significant to note that the same union has endorsed the principles of scientific "labor extension" as applied in the Pequot Mills, Salem, Mass. The difference between extended labor as applied in these large eastern and southern mills is a distinction difficult to apprehend.

Other complaints made by the union include alleged discrimination against union workers and their replacement by non-union outside labor; a 10% wage reduction which became effective in February of this year; and "poor working conditions."

Although H. R. Fitzgerald, president and treasurer of the mills has made no statement in regard to the proposed strike, it will be recalled that several months ago he outlined the basis upon which the wage reduction was established and called attention to the lower wage levels existing in other southern textile centers which were competing with the Riverside & Dan River Cotton Mills. In fairness to the mill management it should be borne in mind that living and working conditions at Danville have heretofore been recognized as among the best in the industry.

Developments in Greensboro and Spray, N. C., where union organizers have been active for several months, are apparently at a standstill.

Storing Texas Cotton in New Bedford

New Bedford, Mass. — A consignment of 7,000 bales of unsold raw cotton arrived in New Bedford this week for storage in the Belleville Warehouse. It is the first shipment by water since 1928, and is to be followed by another consignment that will bring the total up to 8,500 bales.

Acetate Rayon Developments

(Continued from page 117)

of drapery colors developed for use on these materials are said to be as fast-to-light as the specially dyed drapery fabrics of other fibers.

Among some of the recent woven-fabric constructions are combinations of acetate and real silk in the filling, with all-acetate warp, which gives a delightful waterfall crepe effect.

The acetate-silk permanent moires, both in colors and prints, continue their well-deserved popularity both in America and abroad. It is stated that since the Celanese companies control the patent covering these permanent moire effects, they can be produced in this country only on fabrics containing Celanese-brand yarns.

In England, as well as in America, the large demand for voiles, georgettes, and other high-class fabrics containing the synthetic fibers still continues, and many of these are being produced from acetate yarns.

The combination of acetate silk and cotton in the "Crepenese" weave fabrics continue to be an unusually large and important factor for fall dresses. This fabric is available in both application and discharge prints. The popularity of rough cloths has led to the development of acetate rayon warp and dupioni filled fabrics which have unusual wear and stability for their low cost.

Acetate silk is being used in increasing quantities in the hosiery and knit goods industry. One of the latest important developments is the use of acetate rayon twisted with real silk in women's hosiery. Combinations of this type of yarn are also being used very successfully in other types of knit goods.

The Rayon Outlook

(Continued from page 136)

of rayon will not in our opinion change very rapidly until there is a potential demand on the part of the buying public, regardless of the price basis of yarns or the manufactured articles.

"When these changes will occur is anybody's guess, but if the producers will curtail production to a point where they can dispose of the same and not accumulate too large stocks on hand, and positively maintain their list prices, when business does turn the corner the industry will benefit quickly and effectively.

"On the whole, we are very optimistic concerning the immediate future of the industry, and unless we are mistaken in our deductions, the price situation will be automatically taken care of when the demands exceed the domestic production of synthetic yarns."

Push Plans for Rayon Promotion Drive

Plans for the rayon promotion campaign to be conducted by the Rayon Institute, are still "in committee" but are rapidly approaching the definite point, it was learned this week. The September issue of "Crown News," monthly bulletin of the Viscose Co., states that "plans for the future functioning of the Institute were contemplated at the last meeting of the organization." John A. Spooner, merchandise director of the Viscose Co., is president of the Institute and is the guiding figure in the new program.

Paulson, Linkroum & Co. Personnel Reorganized

The personnel of Paulson, Linkroum & Co., Inc., New York, has been reorganized effective Oct. 1, according to announcement by L. C. Linkroum, president and treasurer. Several of the present employes who have been long associated with the company have been made officers and directors.

Fred S. Wetzell, formerly associated with Paulson, Linkroum & Co., is to return in the capacity of secretary thereby reuniting the Nelson group of mills at Lenoir, N. C., under one sales organization in New York.

Charles R. Erith will become treasurer and George E. Cilley will continue in the capacity of vice-president. Morgan E. Roper and Frank W. Woglom, who have been with this company since its inception in 1903 will be directors of the corporation and Leonard C. Linkroum will continue to be the president and dominating factor.

Mr. Wetzell has for some years specialized in the sale of thread yarns, produced by the Nelson group of mills, of which J. Lee Nelson, Jr. is the active manager. Mr. Nelson believes in the policy of having direct representation with the consumers of his product and he expects the new set-up to be most effective. These mills make high grade combed and carded yarns, both regular and reverse twist, the former for the weaving trade and the latter for the thread business.

It will be the policy of Paulson, Linkroum & Co. Inc. to develop non-conflicting yarn accounts on a direct representation basis. In addition to the Nelson Mills at Lenoir, N. C., they are the sole agents for the Standard Cotton Mills at Cedartown, Ga.

Rayon Imports for July

The Bureau of Foreign and Domestic Commerce, Washington, D. C., reports as follows on the import of rayon yarns, threads, waste, staple fiber and filaments into the United States during July 1930:

	Pounds	Dollars
Yarns and Threads		
France	8,287	10,511
Germany	92,561	74,807
Italy	14,300	11,614
Netherlands	34,760	18,648
Switzerland	21,565	20,211
Canada	100	60
	171,573	135,851
Spun Yarns		
France	297	489
Canada	63	23
	360	512
Filaments	None reported	
Waste		
Germany	7,606	913
Cut or Staple Fiber		
Germany	52,985	22,573

Banker to Address Banquet of N.A.C.M. on Oct. 11

William J. Fortune, Boston banker, whose former connection with the Southern Railroad System and his numerous trips South during the last ten years have given him an opportunity to know considerable about the southern textile industry, will be the principal speaker at the banquet of the National Association of Cotton Manufacturers in Poland Springs, Me., Saturday, Oct. 11.

Harford Powel, Jr., who is among the best known advertising men in the country, and Floyd W. Jefferson, who is temporary chairman of the Board of Directors of the recently organized Textile Export Association of the United States, will address the meeting Saturday morning at 10 a.m., the only other business session of the two-day annual meeting which opens Friday, Oct. 10.

Worsted Spinners Hold Annual Field Day

PHILADELPHIA. — Worsted spinners held annual outing Sept. 24, at Manufacturers' Country Club, Oreland, Pa., all sections of the spinning trade being well represented. Golf for the President's Cup was the leading event of the day, although the committees headed by Ernest R. Townson, chairman of field day committee, had a comprehensive program arranged for non-golfers, baseball game between Boston and Philadelphia being an attraction. Dinner was served in evening followed by various indoor sports. A more detailed description of the outing will be published in these columns in Oct. 4 issue.

Cotton-Textile Institute Gains Seven New Members

Seven North Carolina cotton mills have just joined The Cotton-Textile Institute, it was announced at the Institute offices this week. The latest additions to the Institute membership include: Character Products Co., Salisbury, N. C.; Groves Mills No. 1, Gastonia, N. C.; Johnston Mfg. Co., Charlotte, N. C.; Merce Mills, Lincolnton, N. C.; Pomona Mills, Greensboro, N. C.; Valdese (N. C.) Mfg. Co.; and Vann-Moore Mills, Franklinton, N. C.

Awning Makers to Meet

C. R. McClure, of the Memphis (Tenn.) Tent & Awning Co., is chairman of arrangements for the National Tent and Awning Manufacturers Association meeting, which will be held in Memphis, Oct. 6 to 9. Mr. McClure states that 600 tent and awning manufacturers are expected to attend.

Clemson College Opens New Year

CLEMSON COLLEGE, S. C.—The Clemson College Textile department has just opened another college year with a full enrollment of undergraduate students, together with a number of candidates for advanced degrees.